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C-17 OPERATIONS PROCEDURES

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This manual implements Air Force Policy Directive (AFPD) 11-2, *Aircraft Operations* and references Air Force Instruction (AFI) 11-202, Volume 3, *General Flight Rules*, as well as Air Force Tactics Techniques and Procedures (AFTTP) 3-3.C-17. This is a specialized publication intended for use by Airmen who have graduated from technical training related to this publication. It establishes policy for the operation of the C-17 aircraft to safely and successfully accomplish worldwide mobility missions. It applies to individuals at all levels operating C-17 aircraft, including the Air Force Reserve and Air National Guard, except where noted otherwise. This manual may be supplemented at any level, but all supplements that directly implement this publication must be routed to the Office of Primary Responsibility (OPR) for coordination prior to certification and approval. Refer recommended changes and questions about this publication to the OPR listed above using the Air Force Form 847, *Recommendation for Change of Publication*; route AF Forms 847 from the field through the appropriate chain of command. The authorities to waive wing/unit level requirements in this publication are identified with a Tier ("T-0, T-1, T-2, T-3") number following the compliance statement. See AFI 33-360, *Publications and Forms Management*, **Table 1.1** for a description of the authorities associated with the Tier numbers. Submit requests for waivers through the chain of command to the appropriate Tier waiver approval authority, or alternately, to the requestor's commander for non-tiered compliance items. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with AFMAN 33-363, *Management of Records*, and disposed of in accordance with the Air Force Records Information Management System Record Disposition Schedule. The use of

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SUMMARY OF CHANGES

This document has been substantially revised and must be completely reviewed. Major changes include the removal of sections and paragraph renumbering due to the creation of AFI 11-202V3_AMCSUP, *General Flight Rules*. It standardizes format, paragraphs, and information with other Air Mobility Command (AMC) Mission-Design-Series (MDS) specific Volume 3s by relocating and renumbering throughout.

Chapter 1

GENERAL INFORMATION

1.1. Overview. This manual provides guidance for operating the C-17A aircraft. When guidance in this manual conflicts with an AFI, AFI interim change (IC), or Air Force Guidance Memorandum (AFGM), that document takes precedence.

1.2. Unit commanders and agency directors involved with or supporting C-17A operations shall make current copies of this manual available to appropriate personnel. (T-2).

1.3. Key Words Explained.

1.3.1. "Will", "shall" and “must” indicate a mandatory requirement.

1.3.2. "Should" indicates a preferred, but not mandatory, method of accomplishment.

1.3.3. "May" indicates an acceptable or suggested means of accomplishment.

1.3.4. "NOTE" indicates operating procedures, techniques, etc., considered essential to emphasize.

1.3.5. “CAUTION” indicates operating procedures, techniques, etc., which could result in damage to equipment if not carefully followed.

1.3.6. “WARNING” indicates operating procedures, techniques, etc., which could result in personal injury or loss of life if not carefully followed.

1.4. Roles and Responsibilities.

1.4.1. Major Command (MAJCOM). MAJCOMs will provide guidance and approve waivers (as required), where specified throughout this instruction.

1.4.2. Pilot in Command (PIC). The pilot in command PIC is the aircrew member designated by Competent authority, regardless of rank, as being responsible for, and is the final authority for the operation of the aircraft. The PIC will ensure the aircraft is not operated in a careless, reckless, or irresponsible manner that could endanger life or property. **(T-3).** The PIC will ensure compliance with this publication and the following: **(T-3).**

1.4.2.1. HAF, MAJCOM, and Mission Design Series (MDS)-specific guidance.

1.4.2.2. Flight Information Publications (FLIP) and Foreign Clearance Guide (FCG).

1.4.2.3. Air Traffic Control (ATC) clearances.

1.4.2.4. Notices to Airmen (NOTAMs).

1.4.2.5. Aircraft Technical Orders (T.O.).

1.4.2.6. Combatant Commander’s instructions and other associated directives.

1.4.3. Aircrew. Individuals designated on the flight authorization are responsible to fulfill specific aeronautical tasks regarding operating USAF aircraft as specified in this AFMAN or by other competent, supplemental authority.

1.5. Deviations and Waivers. Do not deviate from policies in this manual except when the situation demands immediate action to ensure safety.

1.5.1. Deviations. The PIC shall report deviations or exceptions taken without a waiver through command channels to their Chief, Major Command (MAJCOM) Standardization/Evaluation, who in turn shall notify Chief, AMC Stan/Eval (lead command) as appropriate for follow-on action. **(T-2).**

1.5.2. Waivers. Unless otherwise directed, waiver authority for the contents of this manual is the MAJCOM/A3 with mission execution authority. For Transportation Command (TRANSCOMM)/AMC operational missions under Operational Control (OPCON) of 18th Air Force, 18 AF/CC is the waiver authority. For aircrews that Change Operational Control (CHOP) to a COCOM, the COMAFFOR is the waiver authority.

1.5.2.1. Waivers affect multiple aircraft/multiple missions but are not permanent in nature (expire at a specific date/time). MAJCOM Stan/Eval shall send HQ AMC Stan/Eval (lead command) copies of MAJCOM/A3-approved waivers. **(T-2).**

1.5.2.2. Short-notice waivers are for specific missions in execution. PICs shall use the Waiver Protocol procedure in **Chapter 3** to secure Air Mobility Wing Commander approval for short-notice waivers. **(T-2).**

1.6. Multiple Command Operations. Plan and conduct all operations that include forces from multiple MAJCOMs using provisions in this manual. MAJCOM/A3s planning multiple command operations are responsible for coordinating MAJCOM/theater unique procedures to included special instructions (SPINS) and air operations directive review with supporting MAJCOM/A3.

1.7. Supplemental Procedures. Forward MAJCOM-approved supplements (attach AF Form 673, *Air Force Publication/Form Action Request*) to Headquarters Air Mobility Command/A3V, 402 Scott Dr., Unit 3A1, Scott AFB IL, 62225-5302.

1.8. Local Supplement Coordination Process. Operations Group commanders (OG/CCs) may define local operating procedures to this instruction in a unit supplement. OG/CCs shall obtain approval from MAJCOM prior to releasing their supplement. **(T-2).** Send an electronic copy of the approved version to MAJCOM/A3V. MAJCOM/A3V will send approved copies to AMC/A3V. **(T-2).**

1.9. Improvement Recommendations. Send comments and suggested improvements to this manual on an AF Form 847, *Recommendation for Change of Publication*, through channels to HQ AMC/A3V, 402 Scott Drive Unit 3A1, Scott AFB IL, 62225-5302 IAW procedures in AFI 11-215, *Flight Manuals Program* and MAJCOM Supplement.

1.10. Definitions. Find explanations or definitions of terms and abbreviations commonly used in the aviation community in Title 14, Code of Federal Regulations, Part 1 *Definitions and Abbreviations*, current edition; *DoD FLIP General Planning*, **Chapter 2**; and Joint Pub 102, *The DoD Dictionary of Military and Associated Terms*. See **Attachment 1** for common terms used herein.

1.11. Aircrew Operational Reports. The reporting requirements in this manual are exempt from licensing IAW AFI 33-324, *The Air Force Information Collections and Reports Management Program.*

Chapter 2

AIRCREW COMPLEMENT/MANAGEMENT

2.1. General. This chapter provides guiding principles to form and manage mobility aircrews to enable work/rest schedules that optimize efficiency of mobility forces engaged in worldwide operations.

2.2. Aircrew Complement. Squadron commanders (SQ/CCs) shall form aircrews based on fragmentation order/mission directive, Crew Duty Time (CDT) and Flight Duty Period (FDP) requirements, aircrew member qualification, and other constraints to safely accomplish the mission tasking. **(T-2).** **Table 2.1** below summarizes crew position requirements for different crew types.

2.2.1. The minimum aircrew member complement for a local training flight is an aircraft commander, pilot, and loadmaster. When a mission requires more than one aircrew member at a position, the SQ/CC will determine whether an instructor and Non-Mission Ready (NMR) crewmember meet mission requirements. **(T-2).**

2.2.2. SQ/CCs shall form augmented aircrews for missions planned to take longer than a basic CDT. **(T-2).** Augmenting aircrew members must be current, qualified, and Mission Ready (MR) in accordance with AFMAN 11-2C-17V1, *C-17 Aircrew Training* unless an instructor is on the Flight Authorizations for that crew position. **(T-2).** SQ/CC shall augment an aircrew for the full Flight Duty Period (FDP). **(T-2).** The MAJCOM/A3 may identify aircrews as augmented during mission execution. (see **paragraph 2.5** for more on CDT/FDP.)

Table 2.1. Aircrew Complement.

Crew Position	Crew Complement		
	Basic	**Augmented**	**Basic + 1 (7)**
Aircraft Commander	1 (6)	1 (6)	1 (6)
First Pilot	1	2 (1)	1(7)
Loadmaster	1 (2,3,5)	2 (4,5)	1(7)

Notes:

(1) Pilots who have graduated from the Aircraft Commander Initial Qualification (ACIQ) course may augment the crew. Pilots who have graduated from the Pilot Initial Qualification (PIQ) course, (when approved by the Sq/CC) may act as the augmenting crewmember.

(2) Two loadmasters or one loadmaster and one pilot are required in the cargo compartment if more than 40 passengers are scheduled to be carried. Both crewmembers must remain in the cargo compartment, one forward and one aft for takeoffs and landings. **(T-2).**

Exception: On personnel airdrop sorties, only one loadmaster is required with more than 40 jumpers planning to jump. This exception does not apply to airland segments of an airdrop mission.

(3) One loadmaster and another qualified crewmember/physiological technician are required in the cargo compartment on any mission segment where cabin altitude exceeds 13,000 feet MSL.

(4) For augmented airdrop missions, one loadmaster must be airdrop qualified; the other loadmaster may be airland qualified. **(T-2)**

(5) Two loadmasters are required for dual-row airdrop and Joint Precision Airdrop System (JPADS)/Improved Container Delivery System (ICDS) missions. Both loadmasters shall be qualified in the specific mission. **(T-2).**

Exception: For DROPSONDE and ICDS airdrop, a single loadmaster may concurrently perform LM1 and LM2 duties.

(6) For formation flight/airdrop, the following lead pilot requirements apply:

(a) Single-element formations. An airdrop instructor or lead pilot is required in the formation (any position) when the element consists of three aircraft. Two ship elements do not require a lead certified pilot. **(T-2).**

(b) Multiple-element formations. An airdrop instructor (for up to two elements) or lead certified (for greater than two elements) pilot is required in the lead, deputy lead and element lead positions. If deputy lead or an element lead abort after station time, any crew can assume their position with the concurrence of the mission commander. Any crew can fly the last ship of a formation even if it is an element lead position. **(T-2).**

(7) Basic + 1 is 2 pilots, 1 loadmaster, and 1 additional mission qualified C-17 pilot or loadmaster (additional crewmember will be dictated by mission requirements).

2.3. Pilots. SQ/CCs shall augment the PIC for missions over 16-hours Flight Duty Period (FDP) and designate those additional pilots authorized to perform PIC duties. **(T-2).** The PIC shall brief the aircrew on the plan to transfer PIC duties. **(T-2).**

2.4. Loadmasters.

2.4.1. A non-current or unqualified loadmaster may serve as a primary aircrew member on any mission when supervised by a qualified instructor or flight examiner loadmaster (direct supervision for critical phases of flight).

2.4.2. Multiple Loadmaster CRM. To ensure good CRM when there is a multiple loadmaster requirement, the primary loadmaster assumes overall responsibility for completion of all checklists. He or she coordinates all Loadmaster mission responsibilities and ensures there is no confusion as to which duties have been accomplished.

2.5. Aircrew Management. SQ/CCs and Command and Control agencies ensure work/rest cycles permit an aircrew adequate time to safely accomplish mission duties and personal time for rest.

2.5.1. Flight Duty Period (FDP). FDP is the period of time starting at mission report time and ending immediately after the aircrew completes the final engine shutdown of the day. SQ/CCs shall form aircrews based on worst-case FDP in the mission directive. Once enroute, the mission directive or C2 agent will inform the PIC of expected FDP at show time. **(T-2).** Reduce FDP when the autopilot fails after departure IAW information below. If the autopilot fails after departure, consider mission requirements and determine the best course of action to preclude further mission delays due to reduced FDP. The best course of action may include diverting to an airfield with maintenance capability. Contact C2, coordinate intentions, and comply with limitations.

2.5.1.1. Basic Crew FDP. The maximum FDP for a basic aircrew (including Basic +1) is 16 hours (12 hours when the autopilot and/or autothrottles are inoperative). All Air to Air Refueling (AAR) and tactical events will be accomplished within the first 14 hours of the FDP. **(T-3)**

2.5.1.2. Extended enroute ground times, non-optimum routing/winds, weather delays or other extenuating circumstances will increase a basic to an augmented FDP. When this occurs, a PIC with an augmented crew may accept an augmented FDP as long as the C2 agent or PIC discovers the extenuating circumstances before the first takeoff of the day and the PIC verifies all augmenting aircrew members can get adequate rest enroute.

2.5.1.3. A PIC with a basic crew may seek mission execution authority approval to extend the FDP as much as 2 hours to complete a scheduled mission. If requested, give consideration to also coordinating a CDT extension to allow for completion of post-mission duties within maxium CDT. Only use this provision to recover from unscheduled/unplanned enroute delays. C2 agents cannot direct PICs to exercise this option.

2.5.2. Augmented Crew FDP. Maximum FDP for an augmented aircrew is 24 hours (16 hours when the autopilot and/or autothrottles is/are inoperative). All Air-to-Air Refueling (AAR) and tactical events will be accomplished within the first 18 hours of the FDP. **(T-3).** SQ/CC need only augment the pilot portion of the aircrew when the autopilot is inoperative.

2.5.2.1. Two aircraft commanders are required if AAR is accomplished after 14 hours flight duty period. **(T-3).** Intent is to manage rest cycles to have one AC accomplish any AAR prior to the 14 hour point, and the second AC accomplishes the AAR past the 14 hour point. The second aircraft commander fulfills the requirement for an additional pilot.

2.5.2.2. SQ/CC will augment an aircrew when FDP exceeds 16 hours and the mission profile will allow augmenting aircrew members adequate time to rest enroute. **(T-3).** As a minimum, the mission profile must provide the following:

2.5.2.2.1. At least one 6-hour leg or two 4-hour legs. **(T-3).**

2.5.2.2.2. If the mission profile does not meet the leg length criteria in **paragraph 2.5.2.2.1**, but includes at least one 5-hour leg or two 3-hour legs, the maximum FDP is limited to 18 hours. **(T-3).**

2.5.2.2.3. All AAR and tactical events will be accomplished within the first 14 hours of the FDP. **(T-3).**

2.5.2.2.4. Only MAJCOM/A3 may extend to a 24-hour augmented day once an augmented crew begins an 18 hour day. (All other restrictions apply).

2.5.2.3. Any AAR or airdrop shall count as an intermediate stop. **(T-3). Exception:** Multiple drops conducted within 1 hour of each other are considered to be 1 airdrop for the purpose of "intermediate stop".

2.5.2.3.1. No more than 3 intermediate stops after 14 hours of FDP. **(T-3).**

2.5.2.3.2. PICs validate planned leg times based on actual conditions. PICs may swap an extended ground time (4-hours) for a mission leg when conditions afford aircrew members a chance for rest.

2.5.3. Crew Duty Time (CDT). CDT is that period of time an aircrew may perform combined ground/flight duties. Plan the mission so aircrew members may complete post-mission duties within maximum CDT. An aircrew member may perform mission-related duties for other missions when approved by member's home station SQ/CC or equivalent. Maximum CDT is 18 hours and 0 minutes for a basic aircrew and 24 hours and 45 minutes for an augmented aircrew. **(T-3).** Assistant Vice Chief of Staff of the Air Force, Special Air Missions (CVAM)-directed special assignment airlift missions (SAAM) aircrew require 89 AW/CC approval for CDT/FDP extensions.

2.5.4. CDT and FDP include both military duty and civilian work. CDT and FDP begin when an individual reports for their first duty period (military or civilian).

2.6. Scheduling Restrictions. IAW AFI 11-202V3, *General Flight Rules*, SQ/CCs shall not schedule an aircrew member to fly nor will an aircrew member perform aircrew duties:

2.6.1. Within 12-hours of consuming alcoholic beverages (based on scheduled takeoff, or ALFA standby force legal for alert time, or earliest takeoff time from BRAVO alert) or while impaired by its after effects. **(T-2).**

2.6.2. When using nasal sprays to treat symptoms of head congestion existing before flight. An aircrew member may use oxymetazoline or phenylephrine nasal sprays as "get-me-downs" following an unexpected ear or sinus block during flight. Following use, crewmember will be considered DNIF until cleared by a flight doctor. **(T-2).**

2.7. Crew Rest/Enroute Ground Time. The OG/CC, may waive any portion of the crew rest period or ground time as needed to meet mission tasking. The waiver authority is delegable, but no lower than to the SQ/CC. **(T-3).**

2.7.1. **Exception:** ACC, AFRC, ANG, and AETC in accordance with AFI 11-202V3, General Flight Rules, and appropriate supplement.

2.7.2. Off-station/Enroute Ground Time. Mobility planners shall provide aircrews at least 16+30 hours ground time between engine shutdown and subsequent takeoff. **(T-2).**

2.7.2.1. Mission planners, PICs, or C2 agents may modify ground time as follows:

2.7.2.1.1. In the interest of safety.

2.7.2.1.2. To start (mission reporting time) no earlier than 12-hours from the time the aircrew entered crew rest. Before reducing ground time, PICs will consider time to complete mission planning, cargo on-/off-load, and non-standard mission related duties. **(T-1).** C2 agents will not ask PICs to accept less than 16+30 hours ground time. **(T-2).**

2.8. Alerting Procedures. Aircrew alert time is normally 3+45 hours (4+15 for airdrop missions) before scheduled takeoff time (allows 1-hour for reporting and 2+45 hours (3+15 for airdrop missions) for mission preparation). Individual locations may increase or decrease this time depending on specific capabilities. OG/CCs may establish self-alert procedures for local training missions.

2.9. Mission Essential Personnel (MEP). Procedures and policies regarding MEP are contained in AFI 11-401, *Aviation Management* and AFI 11-202V3_AMC Sup.

2.10. Stage Management. CDT for real world crisis response will begin when the crew shows for the real world mission. (T-3).

2.11. Orientation Flights and Incentive Flights. Refer to DoD 4515.13, *Air Transportation Eligibility*, AFI 11-401and the appropriate MAJCOM supplement.

2.12. Mission Mobility Observers (MMO). MAJCOM supplements or additional directives may establish programs authorizing senior military and civilian personnel to fly for mobility mission familiarization. For AMC MMO information reference AMCI 11-208, *Mobility Air Forces Management*.

2.13. Flight Attendants on Distinguished Visitor Missions. Flight attendants may fly as primary crewmembers on designated C-17 missions. They fall under the authority of the PIC, or MC (if assigned), throughout the mission. An egress briefing will be given to the flight attendants prior to the first mission leg. **(T-3).**

Chapter 3

AIRCRAFT OPERATING RESTRICTIONS

3.1. Objective. Redundant systems may allow crews to safely perform some missions when a component/system is degraded. The PIC is the final authority in determining the overall suitability of an aircraft for the mission. The PIC will ensure a detailed explanation of any discrepancy is entered in the AFTO Form 781A, *Maintenance Discrepancy and Work Document*; include the following maintenance identifiers to effectively communicate aircraft status. **(T-3).**

3.1.1. Mission Essential (ME). The PIC will designate an item, system, or subsystem component essential for safe aircraft operation as ME. **(T-3).**

3.1.2. Mission Contributing. The PIC will designate an item, system, or subsystem component, which is not currently essential for safe aircraft operation as mission contributing. **(T-3).** These discrepancies should be cleared at the earliest opportunity. If circumstances change or mission safety would be compromised, re-designate as ME. Do not delay a mission to clear a mission contributing discrepancy.

3.1.3. Open Item (OI). The PIC will designate discrepancies not expected to adversely impact the current mission or any subsequent mission as an OI. **(T-3).** These items are normally cleared at home station.

3.2. Minimum Equipment List (MEL) Policy. The MEL is a pre-launch document that lists the minimum equipment/systems to operate the aircraft. It is impractical to prepare a list that would anticipate all possible combinations of equipment malfunctions and contingent circumstances. Equipment/systems with no listed exceptions are considered grounding items. A PIC who accepts an aircraft with degraded equipment/systems is not committed to subsequent operations with the same degraded equipment. PICs are not committed to operations with degraded equipment accepted by another PIC.

3.2.1. The PIC shall account for the possibility of additional failures during continued operation with inoperative systems or components. **(T-2).** The MEL is not intended for continued operation over an indefinite period with systems/subsystems inoperative.

3.2.2. Install all emergency equipment unless there is a mission requirement/directive exemption. **(T-2).**

3.2.3. Waiver Policy. A PIC prepared to operate with a degraded MEL item shall request a waiver through C2 channels. **(T-3).** The PIC shall provide the C2 agent: 1) nature of request, 2) individual crew member qualification, 3) mission leg(s) requiring the waiver, 4) weather or other adverse condition, and 5) the governing directive of waiver request to include volume, chapter, and paragraph. **(T-2).** Initiate waiver requests as soon as possible; plan at least a 1-hour waiver processing time.

3.2.4. PICs operating with waiver(s) for degraded equipment shall coordinate mission requirements (i.e., revised departure times, fuel requirements, maintenance requirements, etc.) with the controlling C2 agency and/or flight manager. **(T-3).** If beyond C2 communication capability, or when it is necessary to protect the crew or aircraft from a situation not covered by this chapter, the PIC may deviate from policies in this manual when the situation demands immediate action to ensure safety. Report deviations (without waiver) through channels to

MAJCOM/A3 within 48-hours. OG/CCs shall collect background information and submit a follow-up written report to MAJCOM/A3 upon request. **(T-2).**

3.3. Waiver Protocol. Waivers to operate with degraded equipment are granted on a case-by-case basis. The PIC determines the need for a waiver after coordinating with the lowest practical level of command. MEL waiver authority is as follows:

3.3.1. The WG/CC or equivalent, delegable no lower than the OG/CC, is the waiver authority for all missions.

3.3.2. Engineering Dispositions (ED). Dispositions are requested when aircraft are damaged and/or established maintenance technical order procedures cannot be followed or do not exist. The on-site maintenance authority is responsible for requesting Engineering Dispositions. Most EDs allow maintenance to repair the aircraft and return it to unrestricted status; dispositions of this nature do not concern aircrews. However, EDs affecting aircrew operations require MEL waiver authority approval.

3.3.2.1. PICs shall coordinate dispositions containing flight restrictions, prohibitions, additional operating limits, or modified/nonstandard operating procedures with the appropriate MEL waiver authority. **(T-2).**

3.3.2.2. PICs will not accept dispositions appearing incomplete, in error, or unsafe. **(T-3).** Prior to rejecting a disposition, the PIC will contact the appropriate MEL waiver authority. **(T-3).** The waiver authority will attempt to resolve the issue. **(T-3). Note:** Requests for deviations or waivers to specific Flight Manuals shall be submitted through the responsible MAJCOM Standardization/Evaluation function to the operating MAJCOM/A3 for approval. **(T-2).**

3.4. Technical Assistance. The PIC may request technical support and additional assistance from their home unit or MAJCOM C2 agency.

3.5. MEL Table Definitions/Column Identifiers. MEL tables are arranged by aircraft system to provide the PIC a mechanism to determine minimum system requirements. Components are listed by number installed and minimum required for flight. Requirements are defined by Home Station Departure/Main Operating Base (MOB) (Column A) and enroute stations (Column B). Local training missions, to include off-station trainers, fall under Column B. An asterisk (*) in the required column indicates the number required is situation dependent; refer to the Remarks/Limitations/Exception column for clarification. The following locations are MOBs for AMC and AMC-gained aircrews: Joint Base Charleston, Dover AFB, Joint Base Lewis-McChord AFB, Joint Base McGuire-Dix-Lakehurst, Travis AFB, Joint Base Elmendorf-Richardson, AK, Joint Base Pearl Harbor-Hickam, HI, March, CA (AFR), Wright Patterson AFB (AFR), Jackson, MS (ANG), Martinsburg, WV (ANG), Memphis, TN (ANG), Stewart, NY (ANG) Charlotte, NC (ANG) and Altus AFB, OK. When transiting a MOB on a de-positioning leg use Column B. **Example:** A McChord C-17 transiting Charleston enroute to Ramstein AB will use Column A. However, when transiting Charleston enroute to McChord (de-positioning) use Column B. **Note:** Column B requirements will not normally be waived when transiting a MOB on a de-positioning leg.

3.5.1. Remarks/Limitations/Exceptions. Some technical information and procedures are contained in this column. This is not all-inclusive; crewmembers shall refer to the flight manual and other directives for procedures, techniques, limitations, etc. **(T-2).**

3.5.1.1. One-time Flight Clarification: Although a one-time flight may be authorized IAW the MEL, maintenance release (clearing the Red X) will still be required. A Red X discrepancy must be downgraded through maintenance channels prior to flight. **(T-3).** Contact 618 AOC (TACC) to coordinate the Red X discrepancy downgrade from the Maintenance Group Commander that owns the aircraft. This condition does not preclude carrying cargo and passengers unless stipulated otherwise by the waiver. The priority is to move the airplane to a repair capable facility. PICs must coordinate with appropriate agencies to ensure repair capability exists at the destination. **(T-3).** One-time flights may include enroute stops only when necessary to recover the airplane. **Example:** An airplane departs on a gear-down flight from Djibouti IAP and requires an enroute fuel stop (Cairo) before landing at the nearest repair capable facility, Sigonella NAS.

3.5.1.1.1. One-time flight to nearest repair capable facility: Flight is limited to the nearest (shortest enroute time) repair capable base.

3.5.1.1.2. One-time flight to a repair capable facility: Flight is not restricted to the nearest repair capable facility.

3.5.1.2. Other Mission and Repair Clarifications:

3.5.1.2.1. Shall be repaired at next repair capable facility: Mission may continue as scheduled, item shall be repaired upon reaching a repair capable facility. **(T-3).** Designate item ME upon reaching repair facility. Once maintenance action is initiated, and it is determined repairs are not possible, the PIC will discuss possible courses of action with C2 agency to return aircraft to service. **(T-3).**

3.5.1.2.2. Mission dictates requirement: PIC shall consider the entire mission profile, not just the next leg. **(T-3). Example:** An airplane is departing an enroute station with repair capability. After engine start it is discovered that the #1 engine anti-ice is inoperative. Icing conditions are not forecasted for the next leg. However, because the mission spans several days and repair capability does not exist at the scheduled enroute stops, the PIC elects to have the item repaired prior to departing.

3.6. C-17 MEL. The MEL **(Table 3.1)** applies to all C-17 models and lists the minimum equipment and systems to launch the aircraft under routine operations. The MEL is not applicable for troubleshooting component failure(s) in flight. However, it may be used inflight to determine aircraft status after recovery. The MEL does not include all equipment or systems essential to airworthiness. The MEL is not intended to promote continued operation of the aircraft for an indefinite period with systems/subsystems inoperative. See this chapter for further information including objectives, policy, and waiver protocol. Additional guidance specific to SOLL operations are listed in AFMAN 11-2C-17V3, Addenda B, *C-17 Special Operations*.

3.7. Navigation Systems. Equipment listed in Flight Information Publication (FLIP) for permitting compliance with Minimum Navigation Performance Specifications (MNPS) is mandatory. Loss of any component before airspace entry requires return to a station with maintenance capability or re-filing via routes permitting equipment degradation. **(T-2).**

3.8. Gear Down Flight Operations. Limit gear down flight operations to sorties required to move the aircraft to a suitable repair facility. **(T-2).** Consider gear down flight only after the PIC exhausts all avenues to repair the aircraft in place.

3.8.1. PICs shall not takeoff until there is reasonable assurance that they will achieve/maintain adequate obstacle clearance (to include enroute stops and alternates). **(T-1).** Reference "Climbout Flight Path – 3 Engines Gear Down" charts in Technical Order (TO 1C-17A-1-1). PICs are reminded to also reference TO 1C-17A-1-1, *Performance Data,* for the appropriate drag index.

3.8.2. Time and communications capability permitting, validate takeoff data with OG/OGV or MAJCOM STAN/EVAL.

Table 3.1. C-17 Minimum Equipment List (MEL).

Item/System	Message/Cue /Alert	Installed	Required		Remarks/Limitation/Exceptions
			A	B	
AIR CONDITIONING / PRESSURIZATION					
Air Conditioning Pack		2	2	1*	One complete Air Conditioning Pack system must be fully operational for flight. Both packs required for takeoff into known icing conditions, or any AE mission.
Ram Air Ventilation Valve		2	1*	1*	Inop Ram Air Inlet Door will be wired open. Cargo Compt Heat may be Degraded.
L/R Pack DISAG Switch		2	1*	1*	Operable switch will correspond to operating pack
HI Flow On Switch		1	0*	0*	Avionics Cooling Override Switch will be operational if HI-Flow Switch is inop.
Remote Temp Control Switch		1	0*	0*	Loadmaster Temp Control Selector will be operational if Remote Temp Controller Switch
Inlet Air Temperature Sensor		6	3*	3*	One sensor per zone will be operational.
Zone Temperature sensor		6	3*	3*	One sensor per zone will be operational.
Environ Control Panel, Pack Discharge Temp/Supply/ Compt Temp Indicator		8	0	0	

Cargo Compartment Recirculation		1	1	0*	Will be operable if one pack is inop.
Environmental System Controller		2	2	1*	Enroute, if one ESC is inop, continue to a station with repair capability.
Cargo Compartment Exhaust Fan		2	0	0	
Trim Air Regulator		2	1*	1*	These requirements cover the Trim Air Differential Pressure Sensor. Inop valve will be locked closed. All associated equipment will be operational on same side as operational trim air regulator.
Trim Air Check Valve		3	2*	2*	Center check valve may be inop
Trim Air Switch /Flt Deck Overhead		1	0	0	
AC Supply Check Valve, Cargo Compt		4	2*	2*	One per side required, inop valve will be closed.
Air Conditioning Outlet Air		13	0	0	
Avionics Cooling Fan		3	2*	2*	These requirements cover the Avionics Cooling Check Valve. 3 required for airdrop above 25K.
Avionics Ground Cooling Inlet		1	1	0*	Will have filter installed for ground operation of avionics equipment.
Avionics Cooling Differential		2	1	1	
Avionics Cooling Inflow Valve		1	0	0	
Ground Inlet Shutoff Valve		1	0*	0*	Will be manually closed for flight if inop.

Avionics Cooling Heat Exchanger		1	0*	0*	Will have air conditioning pack operating for ground ops. Valve will be manually locked open if heat exchanger is inop.
Avionics Cooling Equipment Air		10	0*	0*	Valve required to be closed if corresponding avionics equipment is not installed.
Ramp Temperature Sensor		1	0	0	
Environmental System-Fire Detection	ENV PANEL INOP/ SINGLE	1	1*	1*	These requirements cover the Trim Air OFF/DIS Switch light.
Temperature Control Panel, LM Station		1	0*	0*	Remote Temp Control Switch on ESCP will be operational.
Environ Control Panel APU Air		1	0	0*	Required if no air cart available for engine start.
Cabin Pressure Outflow Valve		1	1*	1*	These requirements include the Outflow Valve Actuator.
Engine Anti-Ice Systems (Includes valves, cockpit switches, temp sensors)		4	4	0*	Will be operational for flights into known or forecast icing. If icing is anticipated, manually open Shutoff Valve after associated engine has been started.
Ice Detector Probe		1	1	0*	Crew will monitor for ice if inop.
Low Temp Cowl Ice Protection		4	4	0*	Will be operational for flights into known or forecast icing.
TAT Heater	TAT Heater L/R	2	2	2*	Will be operational for flights into known or forecast icing.
Window Defog Control Box		1	1*	1*	Windshield (Front) and Sliding window defog must be operational.
Windshield Ice Protection		2	2	0*	Will be operational for flights into known or forecast icing.
Windshield Wipers		2	2	0*	Required for operations in precipitation.

Wing Ice Protection System (Includes valves, cockpit switch, temp sensor)		2	2	0*	Will be operational for flights into known or forecast icing. Failed valve will be locked closed.
BLEED AIR					
Cowl Ice Prot Burst Duct Differential		8	8	4*	One per engine will be operable.
Engine SOVs		4	4	2*	One SOV per wing may be inop provided flight is not conducted into known or forecast icing.
Pneumatic Ground Service Connector		2	0*	0*	APU required if ground service connector inop.
(OBIGGS) Sensing element, overheat detector		142	71*	71*	One loop will be operable per region.
Wing Ice Prot Burst Duct Differential		4	2*	2*	One per wing will be operable.
Wing Isolation Valve		1	1*	1*	May be manually closed after engine start. If manually closed, two bleed sources required for each operating pack.
Manifold Failure Detector		1	1	1	
CARGO MISSION SYSTEMS (AIRLAND)					
Aircrew Data Transfer Device		1	1	0*	Shall be operational if upload of Worldwide Navigation Database (WWNDB) and Terrain Avoidance Warning System (TAWS) is required.
ADTD Printer		1	0	0	
Cargo Loading Stabilizer Struts		2	2	0*	Required to integrally jack the aircraft. Mission may continue to a station with repair capability if struts are not needed for mission accomplishment.

Cargo Rail and Locks (ADS and Logistic)			*	*	**Home Station Departure:** All rails, locks, vertical lips and roller conveyors (ADS and logistic) will be fully operational. **Enroute:** Mission may continue if rail(s), lock(s), vertical lip(s) and roller conveyor(s) are not needed for mission.
Cargo Winch		1	1	0*	Mission may continue if winch is not needed for mission accomplishment.
Ramp Toes		4	4	0*	Will have both stowage pins in each toe. At least one of the ramp toes requires an operational proximity sensor. May have less than 4 operational toes if not needed for mission accomplishment.
CARGO MISSION SYSTEMS					
Aerial Delivery System Controller		1	1	0*	All associated components for airdrop are required.
Troop Door Air Deflector/Troop Door Fairings		2	2	0*	As required for personnel airdrop.
Buffer Stop Assembly (BSA)		1	1	0*	Required when dropping CDS >9400 lbs.
Gate Release Mechanism (GRM)		6	6	0*	As required for CDS airdrop.
Troop Doors		2	2	0*	As required for personnel airdrop.
Paratrooper Retrieval Systems		2	2	0*	As required for personnel airdrop.
Left Rail Bridge Assembly		1	1	0*	Left rail bridge assembly required for equipment drop.
Ramp Edge Cover		1	1	0*	Required for equipment airdrop
Retrieval Winches		2	2	0*	As required for CDS or personnel airdrop.
Tow Release Mechanism		1	1	0*	Required for equipment airdrop.

Roller Conveyor Release Latches			*	*	Airdrop prohibited if release latch in load path is missing, damaged, safety wired, and/or taped to the cargo floor.
COMMUNICATIONS					
Communication Control Unit (CCU)	CCU FAULT X	2	2	2*	With one inop, a one-time flight to a repair capability facility is authorized IAW paragraph 3.5.1.1.
AERO-I, Airline Operational Control (AOC), CPDLC	AERO-I INOP CMU 1,2	1	0*	0*	CPDLC may be required for ATC airspace restrictions.
Comm/Nav Control Panel (CNC)		2	2	1*	#1 CNC required.
Control, Intercom Set (ICS)		7	4*	4*	Pilot's, copilot's, and forward and aft loadmaster's intercom control sets will be operational.
Comm 1		1	1	1	
Comm 2/UHF/ VHF		3	3	2	
Public Address System		1	1	0*	When carrying passengers, PA will be operational unless other suitable means of communication are available.
HF Radios		2	0*	0*	1 required for flights over water or as mission dictates.
DEFENSIVE SYSTEMS					
Missile Warning System		1	0*	0*	As required for the mission.
LAIRCM		1	0*	0*	As required for the mission.
CMDS		1	0*	0*	As required for the mission.
DOORS					
Crew Entrance Door	"ENTRY DOOR"	1	1	1	Indicating systems will be operational.
Emergency Exit Door	"EMERG EXIT"	1	1	1	Indicating systems will be operational.

Hor/Vert Stab Access, Crew Oxygen, Belly Maintenance Door, Maintenance Ditching Hatch Proximity Indicating Systems	"HATCH ACCESS"		*	*	May be inop if the door is visually verified closed and locked.
Paratroop Doors Indicating			*	*	Indicating system shall be operational.
Air Deflector Doors Indicating			*	*	Indicating system shall be operational.
Cargo Door/Ramp Proximity Indicating Systems			*	*	All proximity sensors and indicating systems affecting the ADSC, LFCP, LACP, and PADS will be operational for airdrop missions. All proximity sensors and indicating systems associated with the cargo door and ramp system will be operational. May be inop on unpressurized flights if it can be determined that the locks are positively locked. But, with palletized cargo on board, all door/ramp locks are required to permit cargo jettison.
Cargo Door Downlock Assemblies		2	2	2	
Sidewall Jamb Spindles		34	34	34	
Cargo Door Ditching Locks		4	4	4*	Manual operation permissible to continue the mission to a repair facility, unless aeromed or airdrop.
Cargo Door Uplocks		2	2	2	
Cargo Ramp Latches		22	22	22*	All cargo ramp latches will be operational. Manual operation is permissible, unless aeromed or airdrop.

Cargo Ramp Locks		2	2	2*	All cargo ramp electrical safety locks will be operational. Manual operation permissible, unless aeromed or airdrop.
ELECTRICAL					
Integrated Drive Generators (IDG)	"GEN/OFF" Switchlight Illuminated	4	3	3*	With two inop, a one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1.
AC X-TIE		1	1	1*	If inop, one-time flight to a repair capable facility is authorized IAW 3.5.1.1. provided 4 IDG's and all AC bus ties are operational. If operating with 3 IDG's or any AC bus tie is failed, a one-time flight to nearest repair capable facility is authorized IAW paragraph 3.5.1.1.
AC BUS TIE Relays		4	4	4*	With one inop and all IDGs operational, a one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1.
DC Cross Tie		1	1	1	
DC BUS TIE Relays		2	2	2*	With one inop and transformer rectifiers operational, a one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1.
Transformer Rectifiers		4	3*	3*	DC X-TIE and both DC Bus Ties will be operational.
Batteries		2	2	2	
Static Inverter		1	1	1	
Transfer Buses	AC XFER BUS	2	2	2	
Emergency Power Relays		2	2	2	
Battery Chargers	X BATT NOT CHARGING	2	2	2	
Loadmaster Bus 1	LM 1 BUSES	1	1	1	
Loadmaster Bus 4	LM 4 BUSES	1	1	1	

External Power		1	1	0*	External power is required for Aeromedical Evacuation Mission.
60hz Power Supply System		1	1	0*	Will be operational for Aeromedical Evacuation Missions.
ENGINES/APU					
Engines		4	4	4	
EEC	EEC FAULT X	4	4	4*	One channel (A or B) may be inop. If channel A is inop, engine will operate in N1 mode. Continue mission to a station with repair capability IAW paragraph 3.5.1.2.1.
Ignition System		8	8	4*	CH B may be inop. If only 1 engine has CH A inop, a one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1.
Turbine Cooling Air Valve (TCA)	ENG STABILITY X	4	0*	0*	Inop Valve must be safed open for flight.
EGT Thermocouple Probes		24	20*	20*	6 probes per engine, 5 required; 2 channels per engine, 1 required.
Standby Engine Display (SED)		1	1	1	
Thrust Reversers		4	2*	0*	Inop TRs will be locked out in symmetrical pairs.
Oil Quantity Transmitter		4	0*	0*	Oil pressure and temp indications will be operational. Verify oil quantity prior to flight.
Oil Temperature Indication		4	4	4	
Low Oil Pressure Indication		4	4*	4*	Monitor oil pressure on MFD.
Starter Control Valve		4	4	4*	Starter control valve will be operable manually. For manual operation, starter position indicator (amber engine start button) must be operable.

APU		1	1	0*	APU will be operational for any mission departure into a field without alternate electric/air sources when engine shutdown is planned.
EMERGENCY EQUIPMENT					
FEDS Life Rafts (includes Retractor Assembly and Ladders)		3	3*	3*	Raft quantity will be adequate to accommodate total persons onboard when flight exceeds power off gliding distance from land.
FEDS Initiators		7	7	7	All required for flights exceeding power off gliding distance from land. Exterior initiator is required at all times.
Fire Extinguishers		9	9	9	
Crash Axes		2	2	2	
Ramp Blow		1	1	0*	Required for Aeromedical
Warning Horn		4	2*	2*	One Cargo Bay and one underfloor Warning Horn must be operational.
EQUIPMENT AND FURNISHINGS					
Lavatory		1	1	1*	Continue mission (if practical) to a repair capability facility with IAW paragraph 3.5.1.1. Can be inop with comfort pallet onboard. See AFMAN 11-2C-17V3 Addenda-A for passenger restrictions.
Potable Water System		1	0	0	If inop, ensure adequate supply of water.
Refrigerator		1	0*	0	Mission may continue if meal refrigeration is not required or comfort pallet is available.
FIRE PROTECTION					
Fire Detection System, Engine		4	4*	4*	Either loop A or B for each engine will be operational.
APU Fire Detection Sys		1	1	0*	Either loop A or B will be operational. If inop the APU may not be used.
Smoke Detector, Cargo Compartment		14	6*	6*	Sensors 9, 10, 13 & 14 plus two others will be operable.

Lavatory Smoke Detector		1	0	0	
Crew Rest Smoke Detector		1	0	0	
Avionics Smoke Detector		2	1	1	
IRU Smoke Detector		4	4	3*	Must correspond to inop IRU.
Fire Bottle, Engine	"Agent X Low"	4	4	4*	A one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1.
Fire Bottle, APU		1	1	0*	If inop then APU may not be used.
FLIGHT CONTROLS (AUTO-FLIGHT)					
Flight Control Computer	FCC X	4	4	4*	With one FCC inop, a one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1. For one-time flights, both SCEFCs will be operational, no (Pitch, Yaw, Roll, Pitch Trim Fail) Fail Op messages will be illuminated and the FCC PFBIT must have been accomplished in the previous 24 hours. Air refueling may be restricted IAW T.O. 1C-17A-1. If FCC 1 or FCC 4 is the failed FCC, flight is limited to FL200.
AOA Vanes		6	6	5*	If one AOA vane is INOP, a one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1. as long as both APDMC's are operational. Verify that only one AOA vane is INOP by comparing Avionic, EFCS, APDMC Fault List and WAP.
EFCS BLIN codes		*	*	*	No more than 1 CAT 2 fault for Home Station, and no more than 2 CAT 2 faults for Enroute departures.

Spoiler Control/ Electronic Flap Computer	SCEFC X	2	2	2*	With 1 inop and 4 FCCs operational, a one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1 provided SCEFC PFBIT was accomplished in the previous 24 hours. Air refueling may be restricted IAW T.O. 1C-17A-1.
SCEFCS BLIN Codes		*	*	*	No more than 1 CAT 2 fault for Home Station, and no more than 2 CAT 2 faults for Enroute departures.
Electronic Flight Control Axis	FCS cue with any EFCS Axis "FAIL" Light	5	5	5	
Alpha Limiter System	ALPHA LIMIT INOP	1	1	1	
Stall Warning System	STALL WARNING INOP	1	1	1*	If one system is INOP, a one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1. STALL WARNING INOP will be annunciated when both Stall Systems are INOP.
Stick Shaker		2	2	1*	If one stick shaker is INOP, a one- time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1.
Ground Proximity Warning System	GPWS FAIL	1	1	1*	If inop, TAWS is required. A one- time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1.
Terrain Avoidance Warning	TAWS FAIL	1	1	1*	If inop, continue mission to a station with repair capability IAW paragraph 3.5.1.2.1.
Auto Throttles		1	0	0	
Auto Pilot Panel		1	*	*	Auto-pilot required per mission requirements.
Axis Fail Operation Modes	Roll, Yaw, or Pitch Fail Op		Req	Req	Do not takeoff with any axis fail op condition.

Surface Fail Operation Modes	Aileron, flap, elevator, rudder, or slat Fail Op		Req	*	With any single surface fail op condition, a one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1.
System Fail Operation Modes	ALS, Pitch Trim, ADC Fail Op		Req	*	A one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1.
SCEFC THRTL FAIL	SCEFC THRTL FAIL		Req	*	A one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1.
Aileron Trim Actuator		1	1	1	
Transducer, Flap Position		4	4	4	
Indicator, Flap Position		1	0*	0*	MFD indication will be operational.
Indicator, Speed Brake		1	0*	0*	MFD indication will be operational.
Trim Indicators, Aileron, Rudder,		1	0*	0*	MFD indication will be operational.
Switch, Control, Direct Lift (DLC)		2	1	1	
Slat Actuator		16	14*	14*	One actuator per wing may be inop.
TOGA Button	TOGA Button Fail	1	1	1	
Aileron Actuator, Ratio Changer		1	1	1	
Transducer, RVDT, Stick, Roll		4	4	3*	4 required for ALZ operations.
Integrated Flight Control Module (IFCM), Rudder		2	2	2*	With the upper IFCM inop, a one- time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1.
Elevator Actuator, Ratio Changer		1	1	1	

Autothrottle Disengage Switch		1	1	0*	Required for A/R missions.
Integrated Flight Control Module, Elevator		4	4	4	
Transducer, Position, RVDT, Pitch		2	2	2*	One channel in one RVDT may be inop.
Control Valve, Horizontal Stabilizer		2	2	2	
Horizontal Stab Pitch Trim Motor,		2	2	2	
Tandem Control Valve		4	4	4	
Air Refueling Mode	A/R MODE INOP		*	*	If no A/R is planned, continue mission to a station with repair capability IAW paragraph 3.5.1.2.1.
FUEL					
Valve Assembly, Solenoid, Fuel		2	0*	0*	Primary and secondary climb/dive valve will be operational.
Valve Assy, Secondary Climb/Dive		2	0*	0*	Primary climb/dive valve and override solenoid valve will be operational.
Valve Assy, Primary Climb/Dive		2	0*	0*	Secondary climb/dive valve and override solenoid valve will be operational.
Transfer Pumps, Wing Tanks		4	2*	2*	If fuel quantity in tank 2 or 3 is greater than 36K lbs, respective XFER pump will be operational. One transfer pump/switch per wing may be inop; tank with inop pump will have both boost pumps and crossfeed valve operational.
Transfer Pump, E/R Jet		4	0*	0*	For extended range missions, one pump required per side.
Dump Valves		2	2	1*	Left and Right Master, or Center separation valve, will be operational.

Boost Pumps		8	6*	6*	One per wing may be inop if inboard transfer pumps and crossfeed valves are operational
Separation Valve		1	0*	0*	If failed closed, both A/R isolation valves will be operable.
Receptacle, Ground Refueling		2	1	1	
Panel, Control, Ground Refueling		1	1	0	
Valve, Isolation, Ground Refueling		2	0*	0*	Inop valve will be closed manually prior to takeoff.
Fill Valve		4	4	2*	Four required for A/R missions. Fill valves 1 and 4 will be operational. Over wing refueling is required for affected tanks.
Hi-Level Shutoff Test Valve		4	4	0*	Four required for A/R missions. Quantity Select method required for ground refueling.
Ground Refuel Switch, Overhead Panel		2	0*	0*	Ground Refuel Panel will be Operational.
Crossfeed Valves		4	4	4	
Fuel Manifold Drain & Check Valves & Pump		1	1	0*	May be inop but manifold must stay dry and have manifold drain capability.
Valve, Drain, Manual, Ground Refueling		1	1	1	
Low-Level Fuel Dump Shutoff		4	4	4	
Fuel Quantity Computer		1	1	1*	With one channel inop, a one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1.
Fuel Quantity Display, Overhead Panel		4	4	3*	Total fuel quantity indication will be operational.

Total Fuel Quantity Indicator		1	1	0*	Required if any fuel quantity display inop.
UARRSI System		1	0*	0*	Required for A/R missions.
Door Assembly & Handle, UARRSI		1	0*	0*	Door will be verified open before flight for A/R missions.
Air Refuel Master Valves		2	0*	0*	Inop valve will be manually closed prior to takeoff. With any inop valve, the center separation valve will be operable. One required for A/R missions.
Dimming Unit, A/R Annunciator		1	0*	0*	Required for night A/R missions.
Annunciator Lights, READY, DISC. & LATCHED, Center Post		1	0*	0*	For A/R missions READY light may be inop if overhead panel READY light is operational.
Rheostat, Air Refuel Ann/Slipway, Overhead Panel		1	1	0*	For night missions, A/R may only be accomplished if at least one tanker boom nozzle light is operable.
Switch, L/R Master, DISAG, Air Refuel,		2	1*	0*	Separation valve will be operable. Inop valves will be closed prior to takeoff. Required for A/R missions.
Switch, A/R Amp Override, Overhead Panel		1	0*	0*	Required if Override Boom Latching authorized by mission directive.
HYDRAULICS					

Engine Driven Hyd Pumps		8	8	6*	Only one pump per system may be inop. One pump on systems #2 and #3 may be inop provided the AUX pump for affected system and transfer pump are operational. If a pump fails to depressurize, a one- time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1. **Note**: Hydraulics will annunciate on takeoff roll, therefore, crews should brief takeoff considerations.
Aux Pumps		4	4	3*	If the failed pump is on #2 or #3 system the transfer pump will be operational. If failed pump is on #1 or #4, a one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1. Collar the CB and select the pump to on.
Transfer Pump		1	1	0*	If inop, all system 2 and 3 (engine driven and AUX) pumps will be operational.
Hydraulic System Control Panel	HYD PANEL SINGLE/INOP	1	1	1*	A one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1.
Hydraulic System Controllers	HCU SINGLE/ INOP	2	2	2	
Hyd Manifold Press Transducer		4	3*	3*	Associated pump low pressure light and temp indicator required.
Hyd quantity transducer		4	0*	0*	Associated system reservoir low quantity prox sensor required.
Hyd low quantity prox sensor		4	0*	0*	Associated system reservoir hydraulic quantity transducer required.
Ram Air Turbine		1	1	1	Will be stowed prior to departure.
INDICATING SYSTEMS					
Proximity Sensor Interface Unit (PSDAU, PIU)	PROX UNIT 1,2	2	2	2	

Central Aural Warning Computer		1	1	1	
Loudspeaker, CAWS		2	1	1	
Warning and Caution Computer - WCC	WAC COMPUTER 1 or 2	2	2	2	
Annunciator, Lighted, WACS Fail		2	0	0	
Switch, Master Warning & Reset		2	1	1	
Switch, Master Caution & Reset		2	1	1	
ELT		1	1	1*	If inop, a one-time flight to a repair capable facility is authorized IAW paragraph
Underwater Beacon		1	1	0	
Cockpit Voice Recorder (CVR)		1	1	1*	If inop, a one-time flight to a repair capable facility is authorized IAW paragraph
Single Flight Data Recorder (FDR)		1	1	1*	If inop, a one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1., provided the CVR is operating.
Quick Access Recorder (QAR)		1	1	1*	If inop, a one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1.
LANDING GEAR AND BRAKES					
Wheel & Tire Assy, Main Gear		12	12	12*	See Tire Limits in TO 1C-17A-1 Chapter 5. With any tire exceeding the Maximum Wear Limit (three cords showing), a one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1.
Multiple Disk Brakes		12	12	10*	

Brake Accumulator		2	2	2	
Control Unit, Anti-skid-Brake Temp Monitor		1	1	1	
Anti-Skid Braking	ANTI-SKID INOP	1	1	1	
Transducer, Motional Pickup, Wheel Speed, MLG		12	2	10*	Brakes (7 or 8) and (11 or 12) transducers will be operational. Brake on affected wheel will be capped.
Sensor, Temperature, Brake Monitor		12	8*	8*	One sensor per bogie may be inop.
Indicator, Brake Pressure, Cockpit		1	1	1	
Steering Cylinder Assembly		2	2	2	
Nose wheel Steering Control (Tiller)		2	2	2*	With one inop, a one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1. (The operable tiller will be in Pilot Flying position.)
Landing Gear Indicators		2	2	2*	Accurate gear indication will be available on either CFG page or landing gear control indication panel. With one inop continue mission to a station with repair capability.
Parking Brake	PARK BRAKE INOP	2	2	1*	A one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1.
LIGHTING					
Flight Compartment Lighting		1	1	1*	Main inst panel floodlight, cockpit dome and thunderstorm lights will be operational for night flight.
Light and Buttons, Nurse Call		2	0*	0*	Will be operable for Aeromedical Evacuation missions.

Wingtip Landing Lights, Overt		2	2	1*	One wingtip or nose landing light on each side will be operational.
Winglet Covert IR Retractable Landing Lights		2	0*	0*	Both wingtip lights will be operational for NVG required missions
Nose Landing Light, Overt		2	2	1*	One wingtip or nose landing light on each side will be operational. For NVG takeoffs and landings, both IR nose landing lights will be operational.
Nose Landing Light, Covert		2	0*	0*	Both IR nose landing lights will be operational for NVG required missions.
Nose Taxi Light		2	1*	1*	One may be inop provided the nose landing light on the same side is operational. Not required if mission conducted during daylight hours.
Overt Runway Turnoff Light / Covert Runway		2/2	0	0	
Wingtip Navigation Lamp, Fwd Position		4	4	2*	One bulb per wing will be operational. (**Note:** there are 2 bulbs in each lighting assembly.)
Wingtip Navigation Lamp, Aft Position		4	4	2*	One position light assembly per wing will be operational. (**Note:** there are 2 light assemblies with single white bulbs on each wing.)
Upper & Lower Anti-Collision Light		2	2*	2*	See AFI 11-202V3 for requirements. If either the upper or lower light is inop, a one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1 For SPRO ops, lower light may be removed, upper light must be operational.
Tailcone In-Trail Light		2	0*	0*	One required for night formation flight.
Wing In-Trail Light		2	0*	0*	Two required for night formation flight. Wing tip position lights can be used as an alternate for training only.

Fuselage In-Trail Light		2	0*	0*	Two required for night formation flight.
A/R Flood Light		1	0*	0*	Required for night A/R.
UARRSI Perimeter Light Panel		3	0*	0*	For night missions, A/R may only be accomplished if at least one tanker TMF (Tail Mounted Floodlight) is operable.
UARRSI Slipway Light		1	0*	0*	Required for night A/R.
Emergency Exit Signs		13	13	13	
Emergency Exit Lighting Systems		3	3	3	
Emergency Lighting, Battery Power		3	3	3	
Wing Tip (Strobe) Recognition Lights		4	0	0	See AFI 11-202V3 for requirements.
NAVIGATION SYSTEMS					
Pitot Static Probes	P/S XX MAST/HEAD HTR	4	3*	3*	Upper left (1A) and upper right (2B) probes will be operational to provide standby pitot static instruments. All operative ADC channels will have operable corresponding probes. Corresponding probe heaters must be operational for flights into known icing conditions.
Standby Attitude Indicator		2	2	1*	Pilot will have a full set of standby indicators.
Standby Altimeter Airspeed Indicator		2	2	1*	Pilot will have a full set of standby indicators. Altimeter set function will be operational on both.
Bearing Distance and Heading	Blank display or OFF flags	2	2	1*	Pilot will have a full set of standby indicators.

Core Integrated Processor (CIP)		2	2	2	
Air Data Computer	ADC 1A, 1B, 2A, 2B	4	4	3*	If ADC 1A inop, a one-time flight to a repair capable facility is authorized IAW paragraph 3.5.1.1.
IRUs and Batteries	IRU INOP X	4	4	3*	Includes IRU batteries. See FCC inop guidance.
Military Global Positioning System (MGPS)		2	1	0*	As required for ATC airspace restrictions. Both may be inoperative if CGPS is installed/operational. If both inop APS-150, Wx Radar will revert to degrade mode and FPV will revert to degrade. If both inop, FFS will not function airdrop not authorized.
Commercial Global Positioning System (CGPS)		2	0*	0*	As required for ATC airspace restrictions. Both may be inoperative if MGPS is installed/operational.
TACAN		1	1	0*	As required for mission accomplishment.
PLSR 1/2		2	2	2*	With 1 PLSR inop, a one-time flight to a station with repair capability is authorized, provided a CAT II ILS approach is not required/expected. Aircrew will comply with single FM Immunity receiver procedures in the applicable Area Planning series.
DME 1/2		2	1	1	As required for mission accomplishment.
LF/ADF		1	0*	0*	As required for mission accomplishment.
RADAR Altimeter		2	1	1	
Weather RADAR		1	1	0*	Required for air refueling when TCAS is inop and when thunderstorms are forecast for the planned route of flight.

IFF		1	1	1*	Mode 1, 2, 4, 5 may be inop based on mission/airspace requirements.
TCAS		1	1	1*	Required if ATC airspace mandates equipment, otherwise a one-time flight to a repair capable
SKE/FFS		1	0*	0*	As required for mission accomplishment.
MCD		4*	4	3	
Data Entry Keyboard (MCK)		2*	2	2	
HUD		2	2	1*	5 of 6 displays (HUD/MFDs) will be operational. 2 req'd for ALZ and NVG.
MFD		4	4	3*	5 of 6 displays (HUD/MFDs) will be operational.
MFC		2	2	2	
A/PDMC		2	2	2	
OBIGGS					
OBIGGS		2	1*	1*	Single system operation allowed provided crossfeed valve is operational.
OXYGEN					
25 liter Crew LOX Converter	CREW OXY LOW	1	1	1*	May be inop if PAX and/or auxiliary system and crossfeed are operational.
75 liter PAX LOX Converter	OXY LOW	1	1	1*	May be inop if auxiliary system is operational.
75 liter AUX Converter	OXY LOW	1	1	1*	May be inop if passenger system is operational.
Regulators		10	3*	3*	Pilot, co-pilot, loadmaster regulators will be operational. Other regulator(s) required for each occupied crew position.
Portable Oxygen Bottles		10	10	6	Two minimum required for each primary crewmember. Ensure requirements of AFI 11-202V3 are met.
Quick Don Mask		15	15	3*	Required for each primary crewmember. Ensure requirements of AFI 11-202V3 are met.

Note: An asterisk (*) in the required column indicates the number required is situation dependent; refer to the Remarks/Limitations/Exception column for clarification.

Chapter 4

OPERATIONAL PROCEDURES

4.1. Duty Station. Both pilots shall be in their seats during flight. **(T-2).** With both pilots in their seats, PICs may authorize rest periods for one pilot occupying a primary duty station during non-critical phases of flight (the other pilot will be awake and alert). All crewmembers will be at their duty stations during all critical phases of flight, unless crew duties dictate otherwise. **(T-2).** Headsets or helmets will be worn at all times while crewmembers are operating at their primary duty station. **(T-2).** Due to mission requirements, and at the discretion of the PIC, loadmasters may occupy a seat on the flight deck or in the cargo compartment. During other phases of flight, crewmembers may leave their duty stations, for brief periods, to meet physiological needs and perform normal crew duties provided one pilot remains at a primary duty station during flight. Crewmembers will coordinate with the Pilot Flying (PF) before departing their assigned primary duty stations. **(T-3).**

4.1.1. Use of non-mission related material is prohibited by any crewmember during any critical phase of flight. After completion of the Cruise Checklist, the PIC may authorize the use of other media (computers, books, magazines, etc.) if deemed appropriate. The use of these items shall not interfere with any crewmember's ability to perform their duties. **(T-2).** All non-mission related material will be stowed prior to initiating the Descent Checklist. **(T-3).**

4.2. Flight Station Entry. PICs may authorize passengers and observers access to the flight station during all phases of flight; the total number of persons permitted is limited to the number of seats with operable seat belts and oxygen provisions. Do not permit passengers and observers access to the pilot, copilot, or loadmaster positions. **(T-2).**

4.3. Takeoff and Landing Policy. An aircraft commander, or above, will occupy either the left or the right seat during all takeoffs and landings. **(T-1).** The designated PIC (A-code) is not required to occupy a primary position, but still retains overall authority for conduct of the mission.

4.3.1. An Aircraft Commander (AC) or Instructor Pilot (IP) will make all takeoffs and landings during:

4.3.1.1. Aircraft emergencies, unless conditions prevent compliance. **(T-3).**

4.3.1.2. Emergency Nuclear Airlift Operations (ENAO). **(T-3).** Additional information is located in AFI 13-526V4, *Emergency Nuclear Airlift Operations.*

4.3.1.3. Assault or substandard airfield operations. **(T-3). Exception:** Pilots receiving upgrade training or receiving an evaluation.

4.3.1.4. Category II Instrument Landing System (ILS) approaches and landings when the weather is below Category I minimums. **(T-3).**

4.3.2. Unless the other pilot in the seat is a certified AC or higher, the PIC with less than 100 primary assigned aircraft (PAA) hours since AC certification will make all takeoffs and landings under any of the following conditions:

4.3.2.1. Ceiling/visibility less than 300 feet and/or RVR 4000 (3/4 SM visibility). **(T-3).**

4.3.2.2. RCR less than 12. **(T-3).**

4.3.2.3. Crosswind component greater than 15 knots. **(T-3).**

4.4. Landing Gear and Slat/Flap Operating Policy. The PF commands configuration changes. The pilot monitoring (PM) verifies appropriate airspeed and configuration prior to echoing the gear or slat/flap actuation command. The landing gear is operated by the pilot in the right seat. The slats/flaps are operated by the PM.

4.5. Outside Observer/Jump Seat Duties. Available crewmembers will assist in clearing during taxi operations and any time the aircraft is below 10,000 feet MSL. **(T-3).** Use available crewmembers to assist in ensuring correct aircraft configuration for the selected phase of flight.

4.6. Seat Belts.

4.6.1. All occupants will have a designated seat with a seat belt. **(T-1).** A crew bunk does not meet the requirement of a designated seat. Crewmembers will have seat belts fastened when occupying a duty position, unless crew duties dictate otherwise. **(T-1).**

4.6.2. Equipment will be properly secured and all crewmembers and passengers will be seated with seat belts and shoulder harnesses (shoulder harness does not apply to pax) fastened during taxi, takeoff, landing, AAR, airdrop, and low levels unless crew duties dictate otherwise. **(T-1).** The PIC may authorize passengers to observe AAR, but seat changes will be completed no closer than 100ft in trail. **(T-2).** The PIC may authorize passenger movement via the aircraft Seat Belt sign. Crewmembers may remove the shoulder harness during non-critical phases of flight (i.e. cruise). Crewmembers performing instructor or flight examiner duties are exempt from seat belt requirements if not occupying a primary crew position; however, they will have a seat available with an operable seat belt. **(T-2).**

4.6.3. Litter patients, actual or simulated, must remain secured on litters for takeoff and landing. **(T-3).**

4.7. Aircraft Lighting. Aircraft lighting will be configured IAW AFI 11-202V3, AFI 11-218, *Aircraft Operations and Movement on the Ground*, and applicable T.O.s. See mission directives, SPINS, or OPORD for Night Vision Goggles (NVG) lighting configuration.

4.8. Aircraft Armor. To avoid potential flight control problems while airborne, aircraft commanders are approved to remove the offending armor plates if a flight control check determines interference or binding is occurring. The aircraft commander will then remove the plate and securely stow it. **(T-3).** He/she will then notify maintenance, if available, and write the removal up in the aircraft AFTO Form 781A. **(T-3).**

4.8.1. Aircrew are not permitted to replace the armor themselves. **(T-3).** Only maintenance can replace armor once it is removed.

4.8.2. If a mission requires aircraft armor, notify maintenance and have the armor replaced and secured properly prior to takeoff, if possible. If this is not possible, the aircraft commander will assess the risk and make the decision whether or not to continue the mission to the location requiring aircraft armor. A waiver is not required for removal of single pieces of armor.

4.9. Tobacco Use on Air Force Aircraft. Tobacco use of any type is prohibited on Air Force aircraft. IAW AFI 40-102, *Tobacco Free Living*, tobacco includes, but is not limited to, cigars, cigarettes, electronic-cigarettes ("e-cigarettes"), stem pipes, water pipes, hookahs, and smokeless products that are chewed, dipped, or sniffed.

4.10. Advisory Calls. The PF will announce intentions for departures, arrivals, approaches, and when circumstances require deviating from normal procedures. **(T-3).** The PM will make all advisory calls except those designated for other crewmembers. **(T-3).** **Tables 4.1** through **4.3** list mandatory advisory calls, responses and aircrew actions. **Note:** Automated aircraft advisories satisfy this requirement if the crew acknowledges the advisory.

Table 4.1. Mandatory Advisory Calls, Responses, and Aircrew Actions.

Non-precision Approaches (1)	PM Call	PF Response
50 feet AGL	"50 feet"	

Table 4.2. Mandatory Advisory Calls, Responses, and Aircrew Actions.

Precision Approaches (1)	PM Call	PF Response
50 feet AGL	"50 feet"	

Table 4.3. Mandatory Advisory Calls, Responses, and Aircrew Actions.

Visual Approaches	PM Call	PF Response
500 feet AGL	"500, xxxx" (2)	
300 feet AGL	"300, xxxx" (3)	
50 feet AGL	"50 feet"	
Runway environment in sight	"Runway in Sight" (4)	Announce Intentions

Notes:

(1) On the approach, if the PF can maintain visual contact with the landing runway, and states "Visual," subsequent instrument advisory calls are not required. Refer to Table 4.5. Visual Approach.

(2) "xxxx" equates to a concise description of the unstable characteristic(s) which clearly relay to the PF what actions are required to return the aircraft to a stable platform. If criteria are met, PM states the altitude only (i.e. "1000"). Refer to stabilized approach criteria in paragraph 4.11.

(3) If stabilized approach criteria are not met, PM calls "Go-Around." If criteria are met, PM states the altitude only (i.e. "300"). Refer to stabilized approach criteria in paragraph 4.11.

(4) Not required for multiple practice approaches.

4.11. Stabilized Approach.

4.11.1. Refer to AFI 11-202V3_AMC SUP **paragraph 18.8** for all stabilized approach criteria.

4.11.2. Descent Planning and Energy Management. Awareness of maneuver entry parameters and energy management is crucial to meeting the stabilized approach criteria on every approach. Aircrews will ensure the aircraft is following the planned descent profile. **(T-2).** All non-tactical descents should follow a normal descent profile IAW AFMAN 11-217V1, *Instrument Flight Procedures*, procedures and techniques in the absence of ATC or FLIP guidance. All tactical descents should follow published tactical procedures/profiles. When unforeseen interruptions alter the planned descent, immediately correct any deviations. It may be necessary to hold, request vectors, or take alternate actions in order to comply with the planned descent profile.

4.12. Communications Policy.

4.12.1. Remain cognizant of critical phases of flight and do not allow C2 communications to cause distraction. Communications with C2 should be avoided during departure from the Lineup through After Takeoff checklists and on arrival from the Before Landing Checklist until clear of the runway. If a C2 interruption occurs during these times, answering AOC or AERO-I should be postponed or the crewmember monitoring the C2 radio should simply acknowledge with "Standby."

4.12.2. Aircraft Interphone. Primary crewmembers will monitor interphone during critical phases of flight. **(T-2).** Crewmembers will advise the PF before checking off interphone or operating in ISOLATE. **(T-2).** Crewmembers will ensure personnel on headset, or within listening distance, are cleared prior to discussing classified information over interphone. **(T-2).**

4.12.3. General. Provide ATC position and weather observations when required. If unable to contact an ATC agency, attempt relay through the GLOBAL HF stations.

4.12.4. HF Communications. Confine message traffic to essential operational matters. Perform an HF radio ground check before takeoff if the use of HF radio may be required for ATC or C2 communications. Establish HF contact before going out of UHF and VHF range. If unable to establish HF contact with the controlling HF station, and an alternate means of relay of ATC information in oceanic areas is not available, comply with FLIP.

4.12.5. Use secure and jam resistant communications to the maximum extent possible. In a threat environment, limit radio transmissions with the objective area to those required for safety of flight or factors affecting force employment.

4.13. Crew Resource Management (CRM)/Threat and Error Management. Threat and Error Management provides strategies and tactics to help crews target threats to safe flight operations and decreases the potential for crew error. External threats are events that occur outside the influence of the flight crew and require crew attention and management to maintain adequate safety margins. Internal threats are crew related and are factors that could lead to an error if not recognized and controlled.

4.14. Transportation of Pets. Pets are defined in DoDI 4515.13, Air Transportation Eligibility. Transporting pets in conjunction with the sponsor‘s permanent change of station is authorized. Other pets or animals are normally prohibited, but may be moved according to DoDI 4515.13. Service animals are working animals, not pets. Follow the guidance prescribed in Section 10 of DODI 4515.13, when transporting a qualified individual with a disability who is accompanied by a service animal. **(T-0)**. The service animal shall be properly harnessed and leashed. **(T-3).** Proper

sanitation is the responsibility of the passenger and must be maintained at all times. **(T-3).** Government-Owned Animals (Military working dogs) will be transported in pet crates and manifested as cargo. **(T-3).**

4.15. Alcoholic Beverages. MAJCOM/A3 or NAF/CC may authorize the dispensing of alcoholic beverages.

4.16. Runway, Taxiway, and Airfield Requirements.

4.16.1. Minimum Runway and Taxiway Requirements. Minimum runway width is 90-feet/27.5-meters. Minimum runway length is 3,500-feet. Minimum taxiway width is 50-feet/15.5-meters. Minimum width for Star Turn is 90-feet/27.5-meters. **(T-2).**

4.16.2. Runway Length for Takeoff and Landing. Do not takeoff if computed critical field length exceeds runway available. Minimum runway for a normal landing (3/4 or full flap) is computed landing distance with idle reverse. Minimum runway length for a full flap assault landing is computed ground roll, with max reverse, plus marked landing zone distance. (Marked landing zone distance is normally 500 feet) Touchdown is within the marked landing zone. Weather minimums will be circling minimums, no lower than 600-2. **(T-2).** Prior to landing, the PIC reviews takeoff performance to ensure he/she can take off after the planned offload/onload.

4.16.3. Pilots may accomplish intersection takeoffs provided the operating environment (i.e., gross weight, obstructions, climb criteria, weather, etc.) allows a safe takeoff and departure. Calculate takeoff performance based on the runway remaining from the point at which the takeoff is initiated.

4.16.4. During operations on runways partially covered with snow or ice, base takeoff computations on the reported runway surface condition (RSC) or RCR for the cleared portion of the runway. A minimum of 45-feet either side of centerline should be cleared. If 45-feet either side of centerline is not cleared, compute takeoff data based on the un-cleared portion up to 45-feet either side of centerline.

4.16.5. Use of Overruns. If approach end overruns are available and stressed or authorized for normal operations, they may be used to increase the runway available for takeoff. Departure end overruns (if stressed and authorized) may also be used for landing if needed.

4.16.6. Markings required for assault landing zone (ALZ) operations are depicted in AFI 13-217, *Drop Zone and Landing Zone Operations*.

4.16.7. Arresting Cables.

4.16.7.1. Do not land on (touchdown on) approach end arresting cables (does not include recessed cables). If the aircraft lands before the cable, the crew should contact the tower to have the cable inspected.

4.16.7.2. Do not takeoff or land over an approach end cable that has been reported as slack, loose, or improperly rigged by NOTAM, automated terminal information service (ATIS), or ATC.

4.16.7.3. When conditions permit (aircraft gross weight, runway length, weather, winds, TOLD, etc.) and the pilot in command has considered the potential for damaging the aircraft, make takeoffs and landings beyond raised cable barriers. Use the entire length of

runway if necessary. Be aware that operations over arresting gear barriers at speeds in excess of taxi speed may result in damage to the aircraft.

4.16.8. Other Airfield Requirements.

4.16.8.1. Consult with HQ AMC/A3AS (Airfield Suitability Branch) for suitability guidance. Airfield certification requirements are detailed in the Airfield Suitability Restriction Report (ASRR). Aircrews and planning agencies will contact HQ AMC/A3AS for all questions pertaining to airfield weight bearing capacity and will review the Global Decision Support System (GDSS) or ASRR. **(T-2).**

4.16.8.2. A current landing zone (LZ) survey (within the past five-years as specified in AFI 13-217) is needed before using other than hard-surfaced runways or taxiways.

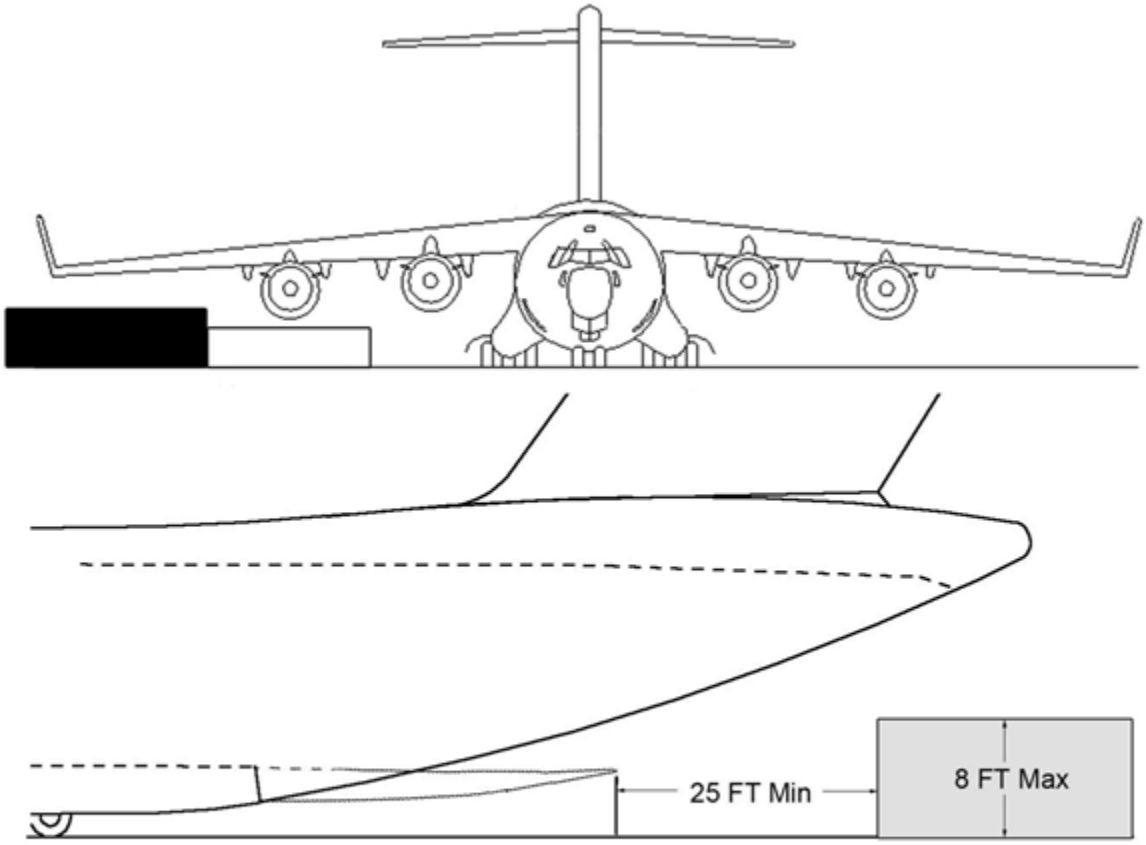
4.16.9. RCR Considerations. Runway Condition Assessment Matrix (RCAM) should be used in conjunction with reported RCR at some airfields. When no RCR is available, the PIC refers to GP for standard ICAO conversions based on general runway condition. During periods of reported low RCR, the taxiways and ramps may have an even lower RCR than reported for the runway. The runway surface should be considered wet when water on the runway causes a reflective glare.

4.16.10. Semi-Prepared Runway Operations (SPRO). See T.O. 1C-17A-1-1, *Performance Data*, Appendix B. For semi-prepared ALZs other than matted surfaces, the PIC will ensure proper engineering evaluations (i.e. Dynamic Cone Penetrometer (DCP) or equivalent) are completed by qualified personnel within one week of the first landing to verify the LZ meets C-17 requirements. **(T-2).**

4.17. Aircraft Taxi and Taxi Obstruction Clearance Criteria and Foreign Object Damage (FOD) Avoidance.

4.17.1. The pilot will coordinate taxi directions and signals to be used with the loadmaster and marshaller (when available). **(T-3).** Do not taxi an aircraft within 25 feet of obstructions without wing walkers monitoring the clearance between aircraft and obstruction. With wing walkers, avoid taxi obstructions by at least 10 feet. Wing walkers do not absolve the crew of their responsibility for obstruction clearance. For small permanent obstructions underneath the wing and tail, follow clearance criteria in **Figure 4.1**. During reverse taxi operations, do not taxi within 25 feet of an obstruction with or without a marshaller/wing walker. **Exception:** IAW AFI 11-218 aircraft may taxi without marshallers/wing walkers at home station along fixed taxi lines which have been measured to ensure a minimum of 10 feet clearance from any obstruction and the obstruction is permanent. Adjacent aircraft are also considered a permanent obstruction, provided the aircraft is parked properly in its designated spot and is not moving. Aerospace Ground Equipment (AGE) and vehicles are considered permanent obstructions, provided they are parked entirely within a designated area. Areas will be designated by permanent markings such as painted boxes or lines on the ramp or another suitable means. **(T-3).**

Figure 4.1. Taxi Obstruction Diagram.



3' High max (this is 10' from the landing gear doors to 10' outside of the outboard nacelle).

5' High max (this is from 10' outside the outboard nacelle to 10' outside the wingtip).

8' High max (this is 25' from ramp in coplaner. Obstacles higher than 8' require 25' from aft end of tail which is 88' from ramp).

4.17.2. Permanent obstacles (i.e. fuel hydrants), 3-feet high or shorter, are not considered obstructions as long as they remain a minimum of 10-feet away from the landing gear doors. A marshaller or crew member verifies the height and location of 3', 5', and 8' high obstacles to ensure specified clearances from the wing, engines, landing gear doors, and ramp toes or ramp.

4.17.3. Consider positioning loadmaster(s) at paratroop doors to relay taxi obstruction clearances.

4.17.4. Stop the aircraft any time clearance is in question and deplane a crewmember to verify clearance and walk the wing, if necessary. If wing walkers are unavailable, deplane one or more crewmembers to maintain obstruction clearance and provide marshaling using AFI 11-218, *Aircraft Operations and Movement on the Ground*, signals. Use wing walkers, deplaned crewmembers, or a crewmember on interphone positioned at the paratroop door(s) or ramp to act as an observer while maneuvering on narrow taxiways. During night taxi operations, marshalers will have an illuminated wand in each hand. **(T-3).** Wing walkers are only required to have one illuminated wand. Observers should be in a position to see wing walkers at all times (through door or windows) and communicate with the pilot.

4.17.5. FOD Avoidance. Make every effort to minimize the potential for engine FOD. Crews should:

4.17.5.1. Carefully review airfield layout paying particular attention to taxi routes, turn requirements, and areas for potential FOD.

4.17.5.2. Minimize power settings during all taxi operations.

4.17.5.3. Where possible, avoid 180° turns. If required to accomplish a 180° turn on a narrow runway, the turn should be accomplished at an intersection of a link taxiway or at a designated turn around pad.

4.17.5.4. Where possible, avoid taxi operations that position an engine over an unprepared or un-swept surface. If unavoidable, leave the engine in idle (to the maximum extent possible) until the engine is over an improved surface.

4.17.6. Reverse Taxi:

4.17.6.1. The pilot will coordinate reverse taxi directions and signals to be used with the loadmaster and marshaller (when available). **(T-3).** During the entire reverse taxi operation, if the loadmaster states the word "Stop", the pilot will immediately stop the aircraft. **(T-2).** Failure to comply may result in damage to aircraft or injury to personnel.

4.17.6.2. Confirm all passengers are seated with seatbelts fastened and cargo is secure. **(T-2).**

4.17.6.3. The loadmaster must have enough maneuverability to observe and direct reverse taxi, and report any hazards. **(T-3).** The loadmaster provides the pilot with continuous interphone instructions on conditions in the maneuvering area. This includes turns, distance remaining (for wingtips, empennage, and main gear), and stopping point. During aircraft backing, if the pilot and loadmaster lose interphone contact the pilot will stop the aircraft. **(T-3).**

4.17.6.4. When reverse taxiing at night, the pilots and loadmaster will ensure the taxi area is sufficiently lighted. **(T-3).** Use the staging lights, retracted landing lights, or any other source that provides adequate lighting of the taxi area.

4.17.6.5. During reverse taxi operations, stop at least 25 feet from an obstruction with or without a marshaller/wing walker. The aircraft tail cannot be seen by the loadmaster from inside the aircraft and could possibly strike an obstruction well before the main gear tires are near the ramp edge. If any doubt exists as to sufficient clearance, stop the aircraft**.**

4.18. Functional Check Flights (FCFs), Acceptance Check Flights (ACFs) and Operational Check Flights (OCFs). Check flights are accomplished IAW T.O. 1C-17A-6, *Inspection Requirements Manual*, AFI 21-101, *Aircraft and Equipment Maintenance Management*, T.O. 1-1-300, *Functional Check Flights and Maintenance Operational Checks*, and T.O. 1C-17A-6CF-1, *Acceptance and/or Functional Check Procedures Manual.* Periodic Ram Air Turbine (RAT) checks are not considered part of an FCF check. They are conducted IAW T.O. 1C-17A-6CF-1 which can be found on the Electronic Flight Bag (EFB).

4.19. Participation in Aerial Events. See AFI 11-209, *Participation in Aerial Events*, and the appropriate MAJCOM supplement.

4.20. Traffic Alerting and Collision Avoidance System (TCAS). It is imperative to follow resolution advisories (RA) to obtain aircraft separation computed by TCAS. Failure to follow the computed RA may increase the probability of a midair collision. Pilots who deviate from an ATC clearance in response to an RA shall notify ATC of the deviation as soon as practical and promptly return to the ATC clearance when the traffic conflict is resolved or obtain a new clearance. **(T-1).**

4.20.1. For TCAS Traffic Alert and Warning procedures refer to T.O. 1C-17A-1, *Flight Manual*.

4.20.1.1. PM confirms the action being performed by the PF. Advise the PF of any deviation from the vertical path indicated by flight director guidance, the TCAS Plan Position Indicator (PPI) display, and/or other annunciations.

4.20.1.2. If a Ground Proximity Warning System (GPWS) or stall warning occurs, terminate the RA maneuver.

4.20.2. Multi-ship formation.

4.20.2.1. Lead aircraft (or designated alternates) will operate TCAS in the "TA only" mode. **(T-3).**

4.20.2.2. Consideration should be given to having the last aircraft in multi-element formations operating TCAS in "TA only" mode.

4.20.3. Low-level operations. This system was not designed for use in the low level environment, but could provide valuable awareness of light aircraft or other military aircraft using military airspace.

4.20.4. Minimum Navigation Performance Specification (MNPS). IAW the MNPS Manual, excessive climb and descent rates in excess of 1500 fpm when approaching level-off altitude could lead to inadvertent TA/RA warnings.

4.20.5. TCAS event documentation. The PIC will document all pertinent information surrounding an RA event on the AF IMT 651, *Hazardous Air Traffic Report*, and submit the report to the nearest air force safety office. **(T-3).**

4.21. Radar Altimeter. Any crewmember detecting the "TOO LOW" annunciation (PFD/HUD) will immediately notify the PF. (T-3). **Terrain clearance and aircraft position must be verified.** (T-3).

4.22. Buddy Starts. Buddy starts must be approved by MAJCOM/A3 or equivalent (OG/CC for local training missions). **(T-3).** Repeated buddy starts are not authorized for multiple scheduled enroute stops.

4.23. Aircraft Recovery from Unprepared Surfaces. Aircrews should not attempt to recover an aircraft after inadvertent entry onto unprepared surfaces not suitable for taxi; ground crews are responsible for aircraft recovery. Unless an emergency dictates otherwise, aircrews may only accomplish recovery if there is no aircraft damage, the surface will support the aircraft, and the PIC has coordinated with appropriate MAJCOM headquarters maintenance authorities through 618 AOC (TACC), or appropriate C2 agency.

4.24. Ground Proximity Warning System (GPWS) / Terrain Alert Warning System (TAWS). During GPWS/TAWS WARNINGS, apply the escape maneuver IAW T.O. 1C-17A-1, unless during Day VMC operations with terrain/obstacle clearly in sight. Do not delay pull-up

for diagnosis of the low altitude WARNINGS. Failure to roll wings level during the maneuver described above decreases stall margin at heavy aircraft gross weights.

4.24.1. Exceptions to this policy are addressed in the GDSS Giant Report and ASRR for specific airfields. The PIC may only disregard GPWS/TAWS warnings at night or in IMC if all the following conditions are met: **(T-1).**

4.24.1.1. The airfield has a known GPWS/TAWS anomaly as listed in the GDSS Giant Report and ASRR.

4.24.1.2. The warning occurs inside the FAF.

4.24.1.3. A plan of action is briefed to the crew prior to commencing the approach.

4.24.1.4. Either the aircraft is at or above the ILS glideslope or MDA on a Localizer approach with both PLSRs being monitored, or the runway is in sight with the aircraft at or above the glideslope as determined by the VASI, PAPI, or similar device. If any of these conditions are not met execute the escape maneuver.

4.24.2. Ensure the mode of the GPWS/TAWS is commensurate with the aircraft's phase of flight.

4.24.3. Aircrews will annotate all TAWS and GPWS alerts deemed to be nuisance warnings in the aircraft forms (AFTO Form 781A). Write-ups must include type of alert (TAWS/GPWS), aural warning received, location, and time of incident. **(T-2).** Maintenance, in turn, will forward the event data IAW the deficiency report procedures through appropriate command channels. **(T-2).** In addition, crews will annotate nuisance warning information on the TAWS/GPWS Nuisance Event Worksheet and forward to their unit OGV office for processing. **(T-2).**

4.25. Standard AFCS Terminology. Under certain conditions, complete commands may be required. This would require an action, the proper axis, then the setting, e.g., "SELECT HEADING 060."

4.25.1. SELECT or ENGAGE directs the selection of a value on the AFCS panel which results in the value being placed in the "Engaged" (Top) portion of the FMA. SELECT is normally used with rotary knobs labeled "SEL," however, ENGAGE is acceptable. The Flight Director (FD), Takeoff Go-Around (TOGA), Approach (APPR), Attitude (ATT), Airdrop (AD), Autopilot (AP), Autothrottle (AT) are normally engaged. For added clarification, selecting an EPR rating means pressing a thrust rating button on the SED panel; engaging EPR means pressing the AFCS "EPR" pushbutton.

4.25.2. For ATC assigned altitudes, one pilot selects and arms the assigned altitude in the ALT window. Both pilots confirm the altitude in the ALT window is correct.

4.25.3. ARM directs the selection of a value on the AFCS panel which results in the value being placed in the "Armed" (Bottom) portion of an FMA.

4.25.4. For LNAV and VNAV selections, command the actual value intended, not "ARM LNAV" or "ENGAGE VNAV." For example, "ARM VOR" or "ENGAGE VPROF" are proper commands.

4.25.5. Standard terminology is very precise, but can unnecessarily congest cockpit communication. In-flight context generally allows simplified direction and execution. For

example “ARM 10,000” is obviously an altitude command and does not require the noun “altitude” to clearly communicate the PF’s desires. Airspeeds appended with “PITCH” or “THRUST” are sufficiently clear and do not require the use of the noun “speed.” VERT SPDS appended with “UP” or “DN” are sufficiently clear. If requested by the PF, ATC vectors (headings) may be automatically selected, and altitudes automatically armed by the PM. At any time the PM is unsure of the command, he/she will ask for clarification. **(T-2).** If the PF sees an uncommanded FMA, he/she clearly restates the command and ensures the actual value is made.

4.26. C-17 HUD/MFD Endorsement. The C-17 MFD is certified as a single medium display, and may be used as a primary flight reference (PFR). Due to the lack of a full-time attitude reference, the heads up display (HUD) is endorsed as a PFR as long as one primary flight display is present on an MFD. To the maximum extent possible, keep a primary flight display (PFD) on one of the MFDs at all times. When mission requirements dictate, the PFD may be replaced with another display for short periods of time.

4.27. C-17 Engine Start Policy. Maintenance personnel or a crew member should be used to act as “ground” during engine starts. The engines may be started without someone outside the aircraft. If this option is used, ensure all crewmembers are thoroughly briefed.

4.28. Aircrew Data Transfer Device (ADTD). Issued devices from mission planning cells are approved. All other devices to be used on the ADTD require approval from HQ AMC/A3VX.

4.28.1. Do not make changes to any of the operating properties of the ADTD. Installing or running programs not specifically authorized in the flight manual, is prohibited.

4.28.2. The ADTD has not been granted approval for viewing/accessing electronic pubs, regardless of whether the program or file is saved to the hard drive, or read and executed from a removable media source.

4.28.2.1. The ADTD requires a separate DVD/CD drive. This drive is not part of the aircraft equipment, therefore they are included in the Trip Kit. If the drives are missing or damaged, do not make a write-up in the AFTO Form 781A.

Chapter 5

AIRCREW PROCEDURES

Section 5A—Pre-Mission

5.1. Pre-Mission Actions.

5.1.1. Large Aircraft Infrared Counter-Measure (LAIRCM).

5.1.1.1. Aircrew should utilize the LAIRCM to the maximum extent possible and IAW SPINS.

5.1.1.2. The UDM card will be stored in the secure stowage facility (gun box) on board the aircraft anytime the LAIRCM system is not in use. **(T-3).**

5.1.1.3. A SF 702, *Security Container Check Sheet*, will be annotated by the individual opening and closing the gun box. **(T-3).**

5.1.1.4. The PIC is responsible for ensuring the UDM card is in the gun box prior to the flight, and before leaving the aircraft at the end of the duty day.

5.1.1.4.1. If the UDM card is missing, notify appropriate C2 agency.

5.2. Aircrew Publications Requirements. Primary crewmembers will carry (or have in-flight access to) the publications specified in **Table 5.1** on all missions. **(T-2).** "P" designates the publication is required to be carried in paper format. "D" designates the publication may be carried in either paper or digital format. If publications are carried in a digital format, the unit will provide the media to view the digital publications. **(T-2).** The unit may specify additional publications in their unit supplement to this instruction. Reference AFI 11-215, *Flight Manuals Program*, for guidance on electronic publications. OGVs will ensure units maintain and provide a current paper copy of T.O. 1C-17A-1CL-1 and T.O. 1C-17A-1CL-2 in the aircraft mission kits. **(T-2).** Pilots must have one 1C-17A-1CL-1 in one of the map bins during all phases of flight. **(T-2).**

Table 5.1. Aircrew Publications.

PUBLICATION	AIRCREW
TO 1C-17A-1	D
TO 1C-17A-1-1	D
TO 1C-17A-1-2	D
TO 1C-17A-1-4	D (Airdrop only)
TO 1C-17A-1-5	D (SOLL II Only)
Abbreviated Checklists	D (One paper copy of the 1C-17A-1CL-1, 1C-17A-1CL-2 and 1C-17-1-4CL-1 and 1C-17-1-4CL-2 [as applicable])
Fanfold Checklists	P
Checklist Inserts/Briefing Guides	D

ATP-3.3.4.2 (NATO Standard AAR ATP-56)	D
TO 1C-17A-9	D
AFMAN 11-2C-17V3	D
AFI 13-526 (FOUO)	P (PNAF only)
TO 1C-17A-16-1/2	P (PNAF only)

5.3. Airfield Review. Refer to AFI 11-202V3, for non-DoD published approach criteria. As a minimum, airfield review will include: **(T-2)**

5.3.1. Airspace/Airfield Review. FLIP, FIR/Upper Information Region (UIR)/Area Defense Identification Zone (ADIZ) procedures.

5.3.2. Airspace classifications, GDSS/ ASRR, and Giant Report.

5.3.3. Special Pilot in Command (SPIC) airport review.

Section 5B—Predeparture

5.4. Global Decision Scheduling System (GDSS) Account. Pilots will obtain a GDSS account prior to operating on IFM-planned sorties. **(T-3).** Download aircrew departure papers using the GDSS account, at locations without an AMC C2 presence.

5.5. Mission Kits. Carry mission kits on all operational missions. Forms may be maintained and carried electronically provided a printing capability exists (i.e., a portable printer.) Suggested items are listed below. **Note:** An asterisk (*) indicates mandatory for all TACC or AMC missions away from home station and directed by C2 authority.

5.5.1. Forms:

5.5.1.1. *CBP Form 6059B, *US Customs and Border Protection Declaration Form*.

5.5.1.2. *DD1748-2, *Airdrop Malfunction Report (Personnel-Cargo.)* (*Required on Airdrop missions only*)

5.5.1.3. *DD2131, *Passenger Manifest*.

5.5.1.4. *DD1385, *Cargo Manifest.*

5.5.1.5. *CBP Form 7507, *General Declaration (Outward/Inward).*

5.5.1.6. AF IMT 457, *USAF Hazard Report*.

5.5.1.7. *AF IMT 651, *Hazardous Air Traffic Report (HATR).*

5.5.1.8. *AFTO Form IMT 781, *ARMS Aircrew/Mission Flight Data Document.*

5.5.1.9. *AF IMT 1297, *Temporary Issue Receipt*.

5.5.1.10. AMC Form 43, *AMC Transient Aircrew Comments*.

5.5.1.11. AMC Form 54, *Aircraft Commander's Report on Services/Facilities*.

5.5.1.12. AF IMT 711B, *USAF Mishap Report*.

5.5.1.13. *AMC IMT 97, *AMC In-Flight Emergency and Unusual Occurrence Worksheet*.

5.5.1.14. *SF 44, *Purchase Order-Invoice Voucher (Storage Safeguard Form)*.

5.5.1.15. SF Form 702, *Security Container Check Sheet.*

5.5.1.16. *Japanese Customs Service Forms.

5.5.2. Orders:

5.5.2.1. *DD Form 1610, *Request and Authorization for TDY Travel of DoD Personnel*.

5.5.2.2. AF Form 1631, *NATO Travel Orders* (when required.)

5.5.2.3. *AF Form 4327a, *Crew Flight (FA) Authorization*.

5.5.3. Miscellaneous:

5.5.3.1. *Box car seals.

5.5.3.2. *Masking tape.

5.5.3.3. *Pad lock (compatible with crew entry door)

5.5.3.4. CD/DVD drive

5.6. Route Navigation Kits.

5.6.1. A route navigation kit will be carried digitally. **(T-3).** A minimum of 3 EFBs are required for flight. If any required documents cannot be carried digitally, a paper copy is required.

5.6.2. The minimum contents of route navigation kits are in **Table 5.2**. **(T-3).**

Table 5.2. Route Navigation Kit Contents.

Item (applicable to area of operation):	Number
FLIP GP Planning (sections GP, AP/1, AP/1B, AP/2, AP/3, AP/4)	1
FLIP IFR Supplement	1
FLIP Flight Information Handbook	1
FLIP Enroute (high and low)	1
FLIP Instrument Approach Procedures (high and low)	2
Standard Instrument Departures (East and West United States, volumes 1 and 2)	2
Instrument Departures Europe and North Africa (high and low)	2
Standard Terminal Arrival Routes (STAR)	2
TERPS approved Host Nation/Jeppesen Approach Procedures/Charts	As required

Topographical and Sectional Charts for areas of operation (GNC/ONC/TPC/JNC/JOG/Sectionals)	As required
FLIP VFR Supplement	1
DoD Area Arrival Charts	1
Navigation and Comm Database Disks	As required

5.7. Briefing Requirements.

5.7.1. The AMC Briefing Guide addresses all mission phases. The AMC Briefing Guide should be used for each brief. Reference AFTTP 3-3.C-17 for additional briefing information.

5.8. Departure Planning. Use AFI 11-202V3, AFMAN 11-217V1, *Instrument Flight Procedures*, AFMAN 11-217V2, *Visual Flight Procedures* this chapter, and the appropriate MAJCOM supplements. Regardless of the type of departure flown (IFR/VFR), review the following (as appropriate): IFR Departure Procedure, instrument approach plate, NOTAMS, GDSS Giant Report, and suitable terrain charts.

5.8.1. IFR Departures: Aircrews must use an approved IFR departure method as outlined in AFI 11-202V3, and AFMAN 11-217. **(T-1).**

5.8.1.1. Aircraft must meet the published climb gradient for the departure runway with all engines operating. If no minimum climb gradient is published, 200 ft/nm will be used. **(T-1).**

5.8.1.1.1. In the event the aircraft is unable to meet the published ALL ENGINE climb gradient, download cargo/fuel or delay until more favorable conditions exist.

5.8.1.1.2. Minimum climb gradient. The TERPS standard minimum climb gradient is 200 ft/NM, which is based on the standard obstacle clearance surface (OCS) of 152 ft/NM plus the required obstacle clearance (ROC) of 48 ft/NM. If an SDP is not available, the crew must ensure compliance with any obstacle-based minimum climb gradients for the selected departure, with one-engine inoperative. **(T-1).** Contact AMC A3A for Adhoc SDP requests. Minimum climb gradients may be published as a 'Trouble T' restriction in the IFR Take-off Minimums section of FLIP or on a SID.

5.8.1.1.2.1. If operational requirements dictate, the mission execution authority may authorize the PIC to subtract up to 48 ft/NM from the published (or standard) climb gradient for OEI departure planning.

5.8.1.1.2.1.1. For all 618 AOC (TACC), 613 AOC (PACAF AMD), CVAM tasked missions, and training missions with external users, the PIC is authorized to subtract up to 48 ft/NM.

5.8.1.1.2.2. Minimum climb gradients do not take into account low, close in obstacles (obstacles or terrain 200 ft AGL and below) which should normally be published as a NOTE on the SID or IFR departure procedure (Trouble T). Crews must also ensure the aircraft can clear these obstacles. **(T-1).**

5.8.1.1.2.3. If the requirements of **paragraph 5.8.1.1.2.1** cannot be met, download

cargo/fuel or delay until more favorable conditions exist.

5.8.2. Preflight Predictive RAIM Check. Pilots are required to accomplish a predictive RAIM check when terminal area navigation (RNAV) operations (SIDs/STARs/Approaches) are flight planned and no other backup navigation aids/procedures are available.

5.8.2.1. If RAIM will not be available at the time(s) and location(s) when GPS updating is required, the mission must be altered to a time when RAIM will be available. **(T-3).** If the predictive RAIM check cannot be completed, the crew will not file terminal RNAV procedures. **(T-3).**

5.8.2.2. The following websites are available to meet this requirement and contain KGPS NOTAM coverage.

5.8.2.2.1. OCONUS. Users will visit **http://augur.ecacnav.com/augur/app/home** and select the terminal/approach tool and input ICAO departure and arrival points. Select estimated mask angle and FDE algorithm. Two printouts must be generated (one for approach and one for terminal). **(T-3).** The text format result option provides an easy-to-read printout of what times RAIM will be unavailable at the selected ICAO (baro aided column applies to C-17A aircraft).

5.8.2.2.2. CONUS. Users on non-"dot-mil"computers will visit **www.raimprediction.net** and select the grid display tool along with "baro-aiding". **(T-3).** Terminal and NPA (non-precision approach) displays both need to be checked.

5.9. Weather Minimums for Takeoff. Departures with weather below landing minimums are authorized IAW AFI 11-202V3. When weather is below approach and landing minimums (ceiling or visibility) a departure alternate is required. **(T-1).**

5.10. Adverse Weather.

5.10.1. Flight into areas of forecast or reported severe turbulence is prohibited.

5.10.1.1. The C-17A is a category III aircraft for turbulence. Crews should confirm the type of aircraft the forecast turbulence applies to, or what type of aircraft reported the encounter, to gain a more accurate picture for their route of flight. Turbulence category charts are found in *AFWA/TN 98/002, Meteorological Techniques*.

5.10.1.2. The 618 AOC (TACC) issues charts for CAT II aircraft. C-17 crews have to interpret the conditions for their category using the table found in AFI 11-203V2. (e.g. turbulence reported as MOD/OCL SEV [M/(S)] for CAT II is actually MOD [M] for CAT III.)

5.10.2. Flight Managers will not plan flights into freezing levels below -60 degrees Celsius. **(T-1).**

Section 5C—Preflight

5.11. Aircraft Servicing and Ground Operations. Reference **paragraph 9.5** for additional information.

5.11.1. Aircrew T.O. 1C-17A-1, *Preflight Inspection Requirements*.

5.11.1.1. The aircrew T.O. 1C-17A-1, preflight inspection will remain valid until either aircraft ground time exceeds 12-hours (72-hours provided the aircraft is sealed, not flown, and documented entry control is maintained) or another maintenance T.O. 1C-17A-6, preflight is performed. **(T-3).**

5.11.1.2. When an aircrew assumes a preflighted spare or quick turn, perform a thorough visual inspection. **(T-3).**

5.11.2. Fire Protection and Crash Rescue Requirements.

5.11.2.1. The aircraft engine/APU fire extinguisher system fulfills the minimum requirements for fire protection during engine/APU start.

5.11.2.2. A fireguard should be used for all engine starts. A crewmember or ground controller may act as fireguard.

5.12. Cargo Documentation. Proper cargo or mail documentation will accompany each load. **(T-2).**

5.12.1. Load Data Information (Applicable to AFRC/ANG completing 618 AOC (TACC) directed mission). At stations where there is no mobility air transportation function, the aircrew will collect the required load information on each leg, and submit it to the first station, which has such a function. **(T-2).**

Section 5D—Departure

5.13. NVG Departures.

5.13.1. NVG Departure Weather Minimums. Weather minimums for NVG departures for crewmembers who are non-current and/or unqualified is 1500-3. **(T-1).** Current and qualified NVG aircrews may fly NVG departures weather down to 600-2 (OG/CC or equivalent may approve down to 300-1). **(T-2).** Give careful consideration to potential hazards during the critical phase of flight. Other weather limitations are IAW this instruction and AFI 11-202V3, *General Flight Rules*. NVGs have inherent limitations which can further be reduced by poor weather conditions. Consider weather conditions, moon illumination and position, sky glow at dawn and dusk, cultural lighting, and weapon/expendable effects when planning NVG operations.

5.13.2. NVG Crosswind Limits for Departure.

5.13.2.1. Runways 90 to120 feet wide. Maximum crosswind component is 15 knots. **(T-3).**

5.13.2.2. Runways wider than 120 feet. Maximum crosswind component is 20 knots. **(T-3).**

5.13.3. NVG Malfunctions During Takeoff. During an NVG takeoff, if the PF experiences NVG failure, the takeoff may be continued at the discretion of the PIC. The PIC will brief NVG failure on takeoff procedures. **(T-2).** The PM should be ready to immediately assume aircraft control if the PF experiences spatial disorientation or an NVG malfunction.

Section 5E—Enroute

5.14. Flight Progress. In-flight, use all available navigational aids to monitor mission computer navigation performance. Immediately report malfunctions or any loss of navigation capability that degrades centerline accuracy to the controlling air route traffic control center (ARTCC). **(T-2).**

5.14.1. Oceanic procedures. Crews will use the MAJCOM-approved MNPS Oceanic Checklist and the Oceanic Expanded Checklist for oceanic crossings. **(T-2).** Locally generated oceanic checklists are prohibited. Where appropriate, units may augment the MNPS checklist with local supplements such as ALTRV, formation, and other unique mission requirements but in no case will they substitute for the MNPS checklist. **(T-2).**

5.14.1.1. For North Atlantic Oceanic airspace, pilots will follow the procedures written in the latest version of the MNPS manual. **(T-2).** The MNPS manual is produced by the North Atlantic Systems Planning Group (NAT SPG) which does not have the authority to direct crew actions, hence the use of the word "should" throughout the document. However, where the MNPS manual uses "should," crews will interpret this as "shall." **(T-2).** DoD Area Planning procedures will be followed only if they do not conflict with the MNPSA manual.

5.14.1.2. For Northern Pacific Oceanic airspace, pilots will follow the procedures written in the FAA Alaska or Pacific Supplement. **(T-2).** DoD Area Planning procedures will be followed only if they do not conflict with these Supplements. **(T-2).**

5.14.1.3. Pilots will use the following procedure prior to entering oceanic airspace to comply with coast out/in (gross nav) navigation accuracy checks: **(T-2).**

5.14.1.3.1. Select a NAVAID that provides a DME signal (within its standard service volume range) as close to the beam position from the aircraft as possible. DME distance should be no closer than the first two digits of the flight level value (e.g. FL310 equals a minimum distance of 31 miles).

5.14.1.3.2. Display progress page on an MCD and enter the NAVAID identifier at BRG DST TO Line Select Key (LSK) 5R.

5.14.1.3.3. Change one MFD to the ND Compass display and associated MFC HDG REF SEL switch to TRUE.

5.14.1.3.4. Change the NAVAID CDI course selector so as to center the CDI for a course TO the NAVAID, note the DME distance then immediately record the progress page course and distance information displayed onto the Master Document.

5.14.1.3.5. Record the following navigation accuracy check information on the master document: NAVAID identifier, time (UTC), MC Actual Navigation Performance (ANP) value, and courses and distances from progress page display and ND Compass display.

5.14.1.3.6. If the noted DME distance and course in the CNC window are not within 4 miles and 4 degrees attempt another navigation accuracy check with another NAVAID, check MC position during over flight of a VOR /NDB, or use ATC radar position information referencing a NAVAID or airfield compared with the progress page 1 BRG DST TO LSK 5R.

5.14.1.4. Ten minute plotting information will include the following (RNAV Airways do not require plotting): **(T-2)**

5.14.1.4.1. Full Lat/Long position

5.14.1.4.2. UTC time at that position

5.14.1.4.3. Flight level/Altitude

5.14.1.4.4. MC position update source with MC ANP

5.14.1.4.5. Pilot ID switch position

5.14.1.5. Annotate hourly altimeter checks on the master document.

5.14.2. Another pilot will verify waypoint data inserted into the Mission Computer. **(T-3).** Check both the coordinate information and the distances between waypoints against the flight plan.

5.14.2.1. Once the oceanic clearance is received and any time the oceanic clearance is changed, both pilots will reverify waypoint data inserted into the Mission Computer. **(T-3).**

5.14.3. Obtain a coast out fix prior to, or immediately on entering Class II Airspace or over-water segment. **(T-2).** Perform a gross navigational error check using available NAVAIDS and annotate the position and time on the chart. **(T-2).**

5.14.4. When approaching each waypoint on a Class II Airspace, recheck coordinates for the next waypoint. **(T-2).**

5.14.5. Approximately 10 minutes after passing each oceanic waypoint, record and plot the aircraft position and time on the chart, and ensure compliance with courses and ETA tolerances. **(T-2).**

5.14.6. If a revised clearance is received, record and plot the new route of flight on the chart. **(T-2).** Verify course and distance information using an appropriate source (e.g. AMC Course and Distance Tables or electronic FLIP applications). **(T-2).**

5.14.6.1. In the event ATC agency challenges the validity of a flight routing or attempts to negate existing clearances, ACs must evaluate the circumstances. **(T-3).** The normal response will be to attempt to advise the ATC agency that the aircraft will continue to planned destination, as cleared in international airspace. **(T-2).** The key phrase is "in international airspace." Safety of flight is paramount in determining mission continuation. Under no circumstances should aircrews construe a clearance, which routes their mission over sovereign airspace, which was not approved through diplomatic channels before mission departure, as being valid authorization**. (T-1).**

5.14.6.2. Aircrews operating missions requiring unique or specially developed routing will normally be briefed at home station, onload station, and/or by the last C2 facility transited before performing the critical portion of the mission.

5.14.6.3. Aircrews (except on weather reconnaissance missions) normally are not tasked to and should not fly "due regard" routings unless coordinated with the appropriate MAJCOM C2 and specifically directed in the mission FRAG. The "due regard" or "operational" option obligates the military AC to be their own ATC agency to separate

their aircraft from all other air traffic. If operational requirements dictate, ACs may exercise the "due regard" option to protect their aircraft. Aircraft will return to normal air traffic services as soon as practical. **(T-3).**

5.15. Communications. CPDLC/ADS data link communications are only used on AERO-I.

5.16. Weather Forecasts. It is the pilot's responsibility to obtain destination weather prior to descent. The primary sources are 618 AOC (TACC) weather operations, OWSs, and USAF weather flights via pilot-to-meteorologist service (PMSV) or through a USAF aeronautical station. For aircraft flying in EUCOM AOR (ENAME operations) contact 21st Operational Weather Squadron at Sembach AB GE. SOUTHCOM AOR contact 612 SPTS/WX (612th Support Squadron/Weather Flight) at Davis-Monthan AFB, AZ. The ATC system can provide weather information to enroute aircraft.

Section 5F—Arrival

5.17. Instrument Approach Procedures.

5.17.1. Aircraft approach category. The C-17 is a category "D" aircraft. If maneuvering speed exceeds 165 knots, the minimums for category "E" will be used. **(T-1).**

5.17.2. Prior to starting an instrument approach, pilots will confirm their aircraft can comply with the missed approach climb gradient requirements established in AFI 11-202V3. **(T-1).** If unable to meet required climb gradients, pilots must coordinate alternate missed approach procedures with ATC, which will ensure terrain clearance, prior to commencing the approach. **(T-1).** If this is not possible, do not attempt the approach.

5.17.3. Weather minimums. Before starting an instrument approach, or beginning an enroute descent, pilots will confirm the existing weather is reported to be:

5.17.3.1. At or above required visibility for straight-in or sidestep approaches. **(T-1).**

5.17.3.1.1. For PAR approaches, visibility will be no lower than RVR 2,400 (730 meters) or 1/2 mile visibility (800 meters) with no RVR readout available. **(T-1).**

5.17.3.2. At or above required ceiling and visibility for circling approaches. **(T-1).**

5.17.3.2.1. For circling approaches with no published ceiling requirement, the required ceiling shall be computed by taking the published HAA plus 100 feet rounded up to the next one hundred foot value. **(T-1).** (For example, if the HAA is 747 feet, add 100 feet to get 847 feet and then round up to the next one hundred foot value which would be 900 feet. Your ceiling for the approach must be at or above 900 feet.) When circling minimums are published, but not by category, circling approach minimums will be as published, but in no case lower than 600 feet and 2 miles visibility. **(T-1).**

5.17.3.3. Inoperative Approach Lighting. Increase the published visibility minimums of an instrument approach by ½ SM or as noted in NOTAMs, on ATIS, or on the approach plate, when any component of the runway approach lighting system (ALS) is inoperative. (This applies only to the ALS itself, not to VASIs, PAPIs, and other lights that are not a component of the ALS.)

5.17.3.4. If the ceiling is below the value depicted for published DoD or approved precision approach, but visibility is at or above authorized minimums, comply with fuel requirements of **Chapter 11** before initiating enroute descent, penetration, or approach.

5.17.3.5. Variable visibility/ceiling reports. If variable visibilities/ceilings are reported, pilots may use the greatest value reported. If it is subsequently determined that weather is below minimums for the approach, comply with **paragraph 5.17.10**. Do not attempt further approaches until the lowest visibility/ceiling reported is at/above approach minimums.

5.17.4. Flight Instrumentation Requirements. Aircraft are limited to a DH/MDA based on a Height above Touchdown (HAT) of 300-feet and Runway Visibility Reading (RVR) 4,000, or ¾-mile visibility (1,220-meters) with no RVR if full flight instrumentation is not available and operational. Full flight instrumentation consists of the following:

5.17.4.1. PAR and Category I Instrument Landing System (ILS). Flight director, a HUD or PFD and NAV display at each station, and no shared ADC or IRU.

5.17.4.2. CAT II ILS. Flight director, a HUD or PFD and NAV display at each station, and no "No CAT II" warning message. A HUD will be used by the PF position, if available. **(T-2).**

5.17.5. Category I ILS Procedures. Decision altitude for precision approaches will be as published, but no lower than 200-feet height above touchdown (HAT). **(T-2).**

5.17.5.1. ILS Precision Runway Monitor (PRM) Approaches. Both pilots must be certified to conduct an ILS PRM approach. **(T-2).** Comply with the following operational procedures:

5.17.5.1.1. Two operational VHF communication radios are required.

5.17.5.1.2. Brief the approach as an ILS/PRM approach.

5.17.5.1.3. If unable to accept an ILS PRM approach clearance, contact the Federal Aviation Administration (FAA) Air Traffic Control System Command Center (ATCSCC) at 1-800-333-4286 prior to departure time to obtain a pre-coordinated arrival time. Pilots who arrive at a PRM airport unable to accept PRM approach clearance, which did not contact ATC prior to departure, should expect an ATC directed divert to a non-PRM airport.

5.17.5.1.4. All breakouts from the approach shall be hand flown. **(T-1).** Autopilots shall be disengaged when a breakout is directed. **(T-1).**

5.17.5.1.5. Should a TCAS Resolution Advisory (RA) be received, the pilot shall immediately respond to the RA. **(T-1).** If following an RA requires deviating from an ATC clearance, the pilot shall advise ATC as soon as practical. **(T-1).** While following an RA, comply with the turn portion of the ATC breakout instruction unless the pilot determines safety to be a factor.

5.17.5.2. IAW AFI 202-11V3, aircrews may execute Category I Instrument Landing System (ILS) approaches with less than 2400 RVR, but 1800 RVR or greater, at locations without touchdown zone and centerline lighting (or when such system is inoperative) as restricted below:

5.17.5.2.1. Fly the approach using the flight director (FD), heads up display (HUD), or Nav Display. **(T-2).**

5.17.5.2.2. Coupled autopilot (AP) to the Decision Altitude (DA). The approach plate itself must have the note authorizing FD, HUD, or AP to the DA. **(T-1).**

5.17.6. Category II ILS Procedures. DH is based on radar altitude. Minimum HAT is 100 feet. Minimum RVR is 1,200. Maximum crosswind limitation is 10 knots. **(T-2).**

5.17.6.1. Aircrews will not execute an actual Category II ILS to minimums unless both pilots are qualified and current in Category II ILS. **(T-3).** The AC must have logged at least 100 hours in command since AC certification. **(T-3).**

5.17.7. ILS Special Authorization (SA) CAT I Approach. Procedurally, the crew will fly a SA CAT I ILS approach the same as a CAT II ILS approach. **(T-1).** All CAT II limitations (crosswinds, autopilot status, required equipment, AFMAN 11-217 limits, etc.) must be met. **(T-1).** If the crew receives a CAT II unsafe annunciation above 300 feet, they may elect to continue to the normal CAT I minimums to the same runway (no lower than 200 feet DH). If a CAT II unsafe annunciation is received below 300 feet, the crew will immediately commence a go-around, unless visual cues are sufficient to complete the approach to landing. **(T-1).** Use of the HUD to DH is mandatory. SA CAT II ILS approaches are not authorized.

5.17.8. NDB Approach Procedures. NDB approaches may be flown during day, night, or IMC conditions after compliance with any airfield restrictions in GDSS/ASRR. Back up each approach with available navaids/GPS to include loading the NDB coordinates in the Mission Computer.

5.17.9. RNAV Procedures. See **Chapter 8.**

5.17.10. After beginning an Enroute Descent. IAW the Descent, Approach, and Landing section of AFI 11-202V3, *General Flight Rules*, after starting an enroute descent, and the weather is reported or observed to be below approach minimums, the AC has the option of continuing the approach to the missed approach point (MAP)/DH. Comply with the last assigned clearance until a new or amended clearance is received.

5.17.11. Holding. An aircraft may hold at a destination that is below landing minimums, but forecast to improve to or above minimums provided:

5.17.11.1. The aircraft has more fuel remaining than that required to fly to the alternate and hold for the appropriate holding time, and the weather at the alternate is forecast to remain at or above alternate filing minimums for the period, including the holding time.

5.17.11.2. Destination weather is forecast to be at or above minimums before excess fuel will be consumed.

5.18. NVG Approach and Landing.

5.18.1. NVG Approach Weather Minimums. Aircrews may fly NVG instrument approaches which transition to NVG landings with weather down to 600-2 (180m/3200m) (OG/CC or equivalent may approve down to 300-1[90m/1600m]) or circling minimums (whichever is higher). **Note:** Noncurrent and unqualified aircrew are restricted to 1500-3.

5.18.2. NVG Crosswind Limits for Approach.

5.18.2.1. Runways 90 to 120 feet wide. Maximum crosswind component is 15 knots.

5.18.2.2. Runways wider than 120 feet. Maximum crosswind component is 20 knots. (T-3)

5.18.3. NVG Failures During Approach and Landing. If the pilot or copilot experience NVG failure or other malfunctions at or below 300 feet AGL, perform a go-around. The PIC will ensure NVG failure procedures are briefed. **(T-3).**

Section 5G—Miscellaneous

5.19. Hung Flare Procedures. Conduct the following procedures after the live firing of chaff/flares or the crew suspects aircraft battle damage:

5.19.1. After landing, taxi to the de-arm area or another suitable safe location to check for hung ordnance. **(T-3).**

5.19.2. A loadmaster or pilot will deplane the aircraft and check all flare dispensers for hung flares or damage. **(T-3).**

5.19.3. If a hung flare is found, identified by a protruding or partially ejected flare cartridge, the aircraft will remain in a de-arm area until Explosive Ordnance Disposal (EOD) personnel meet the aircraft. **(T-3).** The aircraft must remain in the designated safe area until EOD personnel can clear all hung flares. **(T-3). Note:** Flare squibs that fail to fire are not considered hung flares.

5.19.4. If a hung flare is not found, the aircraft can proceed to the parking location.

Chapter 6

AIRCRAFT SECURITY

6.1. General. This chapter provides guidance on aircraft security and preventing and resisting aircraft piracy (hijacking) of the C-17 aircraft. AFI 13-207-O, *Preventing and Resisting Aircraft Piracy (Hijacking) (FOUO),* AFI 31-101, *The Air Force Installation Security Program*, and specific MAJCOM security publications contain additional guidance. Aircrews will not release information concerning hijacking attempts or identify armed aircrew members or missions to the public. **(T-2).**

6.2. Security. The C-17 is a "Protection Level-3" resource. Aircraft security at non-United States military installations is the responsibility of the controlling agency.

6.3. Integrated Defense. The following security procedures implement AFI 31-101, requirements for C-17 aircraft:

6.3.1. The aircraft will be parked in an established restricted area and afforded protection IAW AFI 31-101. **(T-2).**

6.3.2. When no permanent or established restricted area parking space is available, establish a temporary restricted area consisting of a raised rope barrier, and post with restricted area signs. Portable security lighting will be provided during the hours of darkness if sufficient permanent lighting is not available. **(T-2).** Post security forces IAW AFI 31-101.

6.3.3. At non-United States military installations, the PIC determines the adequacy of local security capabilities to provide aircraft security commensurate with this chapter. If PIC determines security to be inadequate, the aircraft will depart to a station where adequate security is available.

6.3.4. The security force must be made aware of all visits to the aircraft. **(T-3).** The security force POC must be identified to the PIC. **(T-3).**

6.3.5. Security support is a continual requirement and is not negated by the presence of aircrew or ground crewmembers. Security force support terminates only after the aircraft doors are closed and the aircraft taxis. **(T-2).**

6.4. Detecting Unauthorized Entry.

6.4.1. When parking on a secure ramp, the aircraft will normally be left unlocked/unsealed to allow ground personnel immediate access. **(T-3).** If, in the PIC's judgment, the aircraft needs to be sealed or locked in order to detect or prevent unauthorized entry, then:

6.4.1.1. Use available aircraft ground security locking devices (i.e. box car seals/cargo straps on troop doors and escape hatch).

6.4.1.2. Secure the doors in a manner that indicate unauthorized entry (e.g., tape inside of doors to airframe so that entry pulls tape loose).

6.4.1.3. Close and seal the crew entrance door (box car seal). Confirm the condition of the aft hatch seal.

6.4.1.4. Wipe the immediate area around lock and latches clean to aid in investigation of a forced entry.

6.4.1.5. Report any unauthorized entry or tampering to the Office of Special Investigation (OSI), security forces or local authorities, and the C2 agency. Have aircraft thoroughly inspected prior to flight.

6.4.2. During pre-flight activities, aircrews will inspect accessible areas, to include aircraft wheel wells, air conditioning compartments, and cargo compartment for unauthorized packages, personnel, or other unfamiliar devices. **(T-2).** Report any suspicious items to host security forces. Maintain a heightened security posture throughout all pre-takeoff activities.

6.5. Arming of Crewmembers. Crews will arm IAW mission directive (Mission Detail, SPINS, OPORD, etc.) **(T-2).** Arming is required anytime mission directives conflict. The following procedures apply when arming is directed:

6.5.1. Weapons Issue. Before departing home station, obtain weapons, ammunition, box, lock and key. **(T-2).** Anti-hijacking requires hollow-point ammunition. If crews are also required to be armed for force-protection, use ball ammunition. **(T-2).** Force protection arming requires all crewmembers to be armed. When a crewmember departs the aircraft and no longer needs a weapon for anti-hijacking, they can only use ammunition approved/directed per regional guidance (SPINs, OPORD, FCG, etc.) **(T-2).** If an armed crew member leaves the crew enroute, transfer the weapon to another authorized crew member using AF Form 1297. **(T-2).**

6.5.2. Wearing Weapons. Weapons are required for anti-hijacking to include when passengers are not on board. **(T-2).** Crews will be armed prior to arriving at the aircraft and will not de-arm until all passengers are offloaded and post flight duties are complete. **(T-2).** Crews may de-arm after completion of the cruise checklist if there are no passengers on board. Weapons and ammunition will be stored in the aircraft gun box when not required in flight. **(T-2).** Weapons may be worn overtly or concealed when armed for anti-hijacking. One pilot and one loadmaster will each be armed for anti-hijacking. **(T-2).** Do not wear weapons off the flight line except to and from the C2, armories, and other facilities associated with aircrew activities. **(T-2). Exception:** When mission directive does not require crews to arm and transiting CONUS locations, arming is at the discretion of the PIC when enroute locations have an AMC or LRS passenger terminal. Passenger movement will be accommodated to the maximum extent possible IAW DoDI 4515.13, *Air Transportation Eligibility.* **(T-2).**

6.5.3. AMC Passenger Terminal Procedures. Armed crewmembers must discreetly identify themselves to AMC passenger service personnel upon arrival at security checkpoints. **(T-3).** One crewmember will present a valid set of crew orders, their military identification card, and AF Form 523, *USAF Authorization to Bear Firearms*, authorizing the carrying of concealed weapons. **(T-2).** Once terminal personnel verify this, they will allow the crewmember to vouch for the remaining crewmembers. **(T-2).** The entire crew proceed through the magnetometer without removing objects from their pockets. This prevents passengers from determining which crewmembers are armed.

6.5.4. Weapons Storage on the Ground.

6.5.4.1. Aircrews will store weapons and ammunition in the most secure facility available, normally the base armory. **(T-3).** If the PIC anticipates mission delay at a specific facility, weapons and ammunition may be stored in the aircraft gun box.

6.5.4.2. In the event a secure facility is unavailable:

6.5.4.2.1. Non-stage aircrews may store weapons and ammunition in the aircraft gun box.

6.5.4.2.2. Stage aircrews should contact C2 for guidance.

6.5.5. When storing weapons in the aircraft gun box:

6.5.5.1. Weapons should not be unloaded.

6.5.5.2. Inform C2 which crew member has the gun box key. **(T-2).**

6.5.6. Crewmembers will ensure they are reissued the same weapon until mission termination at home station. **(T-2).**

6.5.7. Loading and Transfer of Weapons. Load and unload weapons at approved clearing barrels if available. Do not use a hand-to-hand transfer of loaded weapons to another crew member; place the weapon on a flat surface.

6.6. Force Protection. Remain alert to the possibility of terrorist activities at all times. Reference AFTTP 3-4, *Airman's Manual,* Joint Service Guide 5260, *Service Member's Personal Protection Guide: Combat Terrorism While Overseas,* and DoDIO-2600.16V1_AFI 10-245-O, *Antiterrorism (AT) Program Implementation,* for Force Protection measures.

Chapter 7

TRAINING AND OPERATING LIMITATIONS

7.1. Passengers on Training Missions. Passengers are defined as anyone listed on a passenger manifest. MEPs are not considered passengers.

7.1.1. Initial qualification or re-qualification for pilots will not be conducted with passengers onboard. **(T-2).**

7.1.2. Mission certification training, upgrade training, evaluations, off station trainers, and Joint Airborne/Air Transportability Training (JA/ATTs) may carry passengers only if the aircrew in training is qualified. Tanker and receiver AAR is authorized if the pilot flying is qualified (AF Form 8 on file documenting successful completion of an aircraft flight evaluation including air refueling). **(T-2).**

7.1.3. Multiple practice approaches, touch-and-go landings, simulated emergency training, and airdrops are prohibited with passengers on board. **Exception:** Personnel scheduled to jump following a heavy/CDS airdrop, safeties, MEP (defined in AFI 11-401), exercise participants that will be offloaded by "airland" procedures following the airdrop, or any personnel authorized by the JA/ATT tasking order may be transported on airdrop training missions. Nonparticipants in the exercise, OST, or JA/ATT are prohibited **(T-3).**

7.2. Touch-and-go Landing Limitations.

7.2.1. Only accomplish touch-and-go landings under the direct supervision of an IP. **(T-3).**

7.2.2. Limitations.

7.2.2.1. Comply with all flight manual restrictions and procedures to include performance degradation with fuel, cargo limits, etc. **(T-3).**

7.2.2.2. Minimum runway length: 7,000 ft. Minimum runway width: 120 ft. **(T-3).**

7.2.2.2.1. Raised barriers reduce runway available for touch-and-go landings.

7.2.2.3. Minimum ceiling/visibility: 300 ft and RVR 40 (3/4 SM visibility). **(T-3).**

7.2.2.4. RCR shall be 12 or higher. **(T-3).**

7.2.2.5. Do not accomplish touch-and-go landings on runways reported with standing water, slush, or snow. **(T-3).**

7.2.2.6. Maximum crosswind component: 25 knots. **(T-3).**

7.2.2.7. Touch-and-go landings may be performed with cargo onboard. Touch-and-go landings with hazardous cargo onboard in quantities which require their identification on flight plans are prohibited. **(T-3).**

7.2.2.7.1. Cargo security is checked prior to the first touch-and-go and thereafter at an interval determined by the PIC (should not exceed 1-hour). PICs should allow additional time required for this inspection.

7.3. Training on Operational Missions.

7.3.1. Crews may accomplish AAR training on operational missions provided the following requirements are met:

7.3.1.1. All mission-required fuel is onloaded prior to commencing any training. **(T-3).**

7.3.1.2. Passengers and MEPs are briefed on the activity.

7.3.1.3. AAR training may be accomplished with an unqualified receiver pilot at the controls if under IP supervision and no passengers are on board the aircraft. **(T-3).**

7.3.1.4. Unscheduled AAR is not authorized without coordination with appropriate C2 agencies. **(T-2).**

7.4. Simulated Emergency Flight Procedures.

7.4.1. Simulated emergency flight procedures will be conducted IAW AFI 11-202V3 and this instruction. **(T-2).** Do not practice emergency procedures that degrade aircraft performance or flight control capabilities (in-flight). Emergency procedure training with degraded aircraft performance or non-standard configurations will only be accomplished in the simulator. **(T-2).**

7.4.1.1. The PIC or IP will alert all crewmembers prior to practicing emergency procedures. In an actual emergency, terminate all training and flight maneuvers practice. **(T-2).** Training should be resumed only when the PIC determines it is safe.

7.5. Flight Maneuvers.

7.5.1. Practice of the following maneuvers are prohibited in flight: **(T-1).**

7.5.1.1. Stall and approach to stalls including initial buffet.

7.5.1.2. Dutch roll.

7.5.1.3. Abnormal configuration approaches.

7.5.1.4. Unusual Attitudes

7.5.1.5. Bank angles greater than 60-degrees.

7.6. Flight Pilot Training.

7.6.1. FP may practice AAR from either seat (to include the contact position) with the following restrictions:

7.6.1.1. Accomplished under direct IP supervision.

7.6.1.2. No passengers are authorized. (N/A for Senior Officer Qual FPs with a Form 8 documenting AR accomplishment)

7.6.1.3. Contacts by non-AAR qualified pilots are only made after receiving acknowledgment from the tanker pilot and boom operator.

7.6.2. An FP may perform any tactical maneuver under the direct supervision of an IP.

7.7. Night Vision Goggle (NVG) Training.

7.7.1. Airland Training.

7.7.1.1. Ground Operations Training. NVG combat offloads and ground maneuvering are approved. Combat offloads may be conducted with cargo compartment lighting set to minimum red/ANVIS (overt) or IR (covert).

7.7.1.2. Takeoff and Landing Restrictions:

7.7.1.2.1. Maximum crosswind component is 15 knots. **(T-3).**

7.7.1.2.2. One RA and one GPS must be operational. **(T-3).**

7.7.1.2.3. Both HUDs must be operational. **(T-3).**

7.7.1.2.4. NVG touch-and-go landings are authorized.

7.7.1.3. Runway must be lit with an authorized covert/overt lighting pattern. **(T-3).**

7.7.2. Airdrop Training.

7.7.2.1. Restrictions.

7.7.2.1.1. Drop zones will be lit IAW AFI 13-217, lighting patterns (covert or overt). **(T-3).**

7.7.2.1.2. Loadmasters are authorized to perform heavy equipment, container delivery system, dual row and JPADS airdrops with minimum lighting while wearing NVGs as necessary to assist with operations. Red/NVIS (overt) or IR (covert) cargo compartment lighting will be set at minimum level to perform loadmaster duties safely. **(T-2).** Blacked out (no-light) operations in the cargo compartment are not authorized. The use of NVGs by loadmasters during personnel operations is not authorized. **(T-2).**

7.8. Planned Go Around After Touchdown (GOAT). A GOAT is a planned training maneuver, accomplished in conjunction with a full flap approach to an Assault Landing Zone (ALZ) or simulated ALZ. The approach and landing for the GOAT are accomplished IAW the approach and assault landing sections of T.O. 1C-17A-1. No later than main gear touchdown, a go-around will be initiated IAW T.O. 1C-17A-1. **(T-3).**

7.8.1. An instructor pilot must occupy a primary pilot position during the maneuver. **(T-3).**

7.8.2. The following parameters must be met:

7.8.2.1. Landing data and brake temperatures must support a full stop. **(T-2).** For GOATs to a marked ALZ on a larger than 5,000 ft runway, crews may calculate brake temperature-corrected landing distance for the actual runway remaining, not the marked ALZ.

7.8.2.2. T.O. 1C-17A-1 requirements for landing gear cooling periods following consecutive landings apply.

7.8.2.3. Sink rate reduction and FPV movement are associated with the landing phase and accomplished in addition to the power advance for the go-around.

7.8.2.4. A "TAKEOFF" or "LANDING" cannot be logged for currency, but will be logged on AFTO Form 781H as touch-and-go landings. **(T-2).**

7.8.2.5. Will not be accomplished on Semi-Prepared Runways. **(T-2).**

Table 7.1. Training Flight Restrictions.

Maneuver	Altitude	Remarks
Instrument Missed/Low Approaches	MDA/DH	Initiate practice instrument missed approaches no lower than the minimum altitude for the type of approach executed. **(T-3).**
Visual Low Approach/Planned Go Around	Initiate no lower than 100' AGL	**(T-2).**
Men and equipment on runway	Initiate above 500' AGL	**(T-2).**
CAT II ILS	As published	Minimum ceiling and vis of 200 and ½. Crosswinds up to 15 kts are permitted. **(T-2).**
Tactical Descents	Complete above 2,000' AGL	Due to high descent rates, ensure ATC understands crew intentions. Minimum ceiling is 5000' AGL. NVG tactical descents for training must remain VMC at all times. **(T-2).**
Assault Landing Zone Operations		Max brake temperature 150^{O}C. N/A for GOATs but must have TOLD to support a full stop. **(T-2).**
Note: These restrictions do not apply to operational missions.		

7.9. Miscellaneous.

7.9.1. For unilateral training, center bundle targeting at an Airdrop Damage Estimation (ADE) level 3 is authorized with actuals provided the minimum DZ size is met IAW AFI 13-217 and the ADE Level 3 ellipse is within the confines of the surveyed drop zone. The mission specific Point of Impact (PI) will be validated by OSK. **(T-3).**

7.9.2. Training without GPS updating is encouraged. When conducting GPS off training, crews will be in VMC. **(T-2).** If IFR, do not exceed RNP restrictions for the airspace. **(T-2).** Crews should use an ACM with moving map and GPS puck for debrief and an added factor of safety.

Chapter 8

NAVIGATION PROCEDURES

8.1. Post Flight. For legs in which suspected or reported navigational error, procedural deviation, or other abnormality occurred, download and retain a copy of the M-PLAN all pertinent forms, including, but not limited to DD Form 175, *Military Flight Plan*, DD Form 175-1, DD Form 1801, MAFPS ASR or CFP, charts, and navigation log. Units will maintain all operational mission data on file (hard disk, paper copy, oceanic plotting chart, etc.) for 120-days. **(T-2).**

8.1.1. For suspected/reported airdrop malfunctions or off-DZ drops, record ADXX RECALL page information before leaving the aircraft. **(T-2).**

8.1.2. GPS and Global Navigation Satellite System (GNSS) are synonymous terms when referencing GPS equipment and /or procedures.

8.1.3. Sources for obtaining IRU PPOS coordinates will be in the following priority: **(T-2).**

8.1.3.1. GPS PPOS IAW flight manual.

8.1.3.2. FLIP/Jeppesen Airfield diagrams or MAJCOM-approved parking spot handouts.

8.1.3.3. DoD FLIP Enroute Supplement.

8.1.3.4. Best available chart.

8.2. Navigation Databases/Flight Plans/Data Verification.

8.2.1. Crosscheck WWNDB procedures (DAFIF) against traditional paper FLIP prior to flying any procedure IAW AFMAN 11-217. If a discrepancy is identified, submit the details to unit OGV or Stan/Eval office. Unclassified confirmed discrepancies will be emailed to National Geospatial-Intelligence Agency's (NGA) aero quality feedback section at **quality@nga.mil** and AMC/A3VX. **(T-2).**

8.2.2. Mobility Air Forces Automated Flight Planning System (MAFPS) AMC Standard Report (ASR) Use. MAFPS ASR is the official source of performance, navigation, and climatic data, including enroute wind information. If stand-alone computer based plans are used, each mission segment should utilize best wind data available. Use only MAJCOM validated ASRs. **(T-2).**

8.2.2.1. Use MAFPS ASRs to the maximum extent practical. A printed computer flight plan derived from other MAJCOM-approved planning software is an approved substitute if it includes all MAFPS navigational and waypoint data and enroute wind and temperature deviation data. The computer flight plan must also include the planned payload and ramp fuel. **(T-2).** The PIC has final responsibility for flight plan accuracy and diplomatic clearance compliance. **(T-2).**

8.2.2.2. Verify MAFPS ASR for route of flight and fuel computation accuracy before departure. **(T-2).** Pass any flight plan discrepancies to the 618 AOC flight planning office. **(T-2).** On flight-managed sorties, promptly notify the flight manager of any flight plan discrepancies. **(T-2).** Identify inaccurate MAFPS winds to the flight manager in-flight or 618 AOC flight planners post flight when the wind at the MAFPS flight level exceeds either 30° error in direction or 25-knots in speed. **(T-2).**

8.2.2.3. Flight plan course values may differ between the MAFPS ASR and the mission computer flight plan. The MAFPS ASR course value (mag or true) is the average course direction for that leg. The mission computer flight plan course is the initial course outbound measured from the leg's beginning waypoint after any rollouts. Therefore, the mission computer flight plan course may differ by a few degrees from the MAFPS ASR flight plan course. The magnitude of this difference is more pronounced depending on leg length and direction.

8.2.3. Aeronautical Information Regulation and Control (AIRAC) cycle.

8.2.3.1. Effectivity of the aircraft's WWNDB and aircrew Aeronautical Information Publication (AIP)/FLIP documents are based on AIRAC cycles.

8.2.3.2. ICAO Document 8126 (Aeronautical Information Services Manual) specifies that 00:01 UTC shall be used to indicate the time when new AIP/FLIP documents become effective. **(T-2).** However, some countries have filed an exception. For example, the United States is 09:01 UTC on the effective date while Australia is 16:00 UTC the day prior to the effective date. AIRAC cycle changes require ATC computer systems to be updated. For that reason, some countries have modified their AIRAC cycle change day/time when air traffic is at the normal daily minimum for their airspace.

8.2.3.3. Pilot considerations during non 0001 UTC AIRAC cycle changes. Even though numerous NGA FLIP products have 0001 UTC effective times printed on them, plan not to receive a clearance for new or changed published procedures/routings until that ATC system's airspace computers have been updated.

8.2.4. WWNDB Procedure Omissions. Crews should be vigilant in their review/comparison of mission computer loaded procedures with published Fight Information Publications (FLIP). Numerous procedures that are published in DoD's FLIP may be omitted from the C-17 mission computer database.

8.2.5. Prior to takeoff, departure clearances may be available via CPDLC at some airports by logging onto KUSA in the ATS Menu. The PIC is responsible for ensuring the uploaded flight plan is correct.

8.3. Navigation Capability / Airspace Requirements.

8.3.1. RNAV/RNP.

8.3.1.1. C-17A aircraft are approved for unrestricted MNPS (RNAV 12.6), RNP-10, BRNAV (RNP-5), RNAV 2, RNAV 1, and PRNAV operations.

8.3.1.1.1. C-17A software is approved for enroute and terminal RNP operations down to and including RNP 0.3.

8.3.2. MNPS, RNP-x, P-RNAV, BRNAV, RNAV-2, and RNAV-1 are defined in FLIP and are considered special qualification airspace. Additional restrictions to include CPDLC/ADS equipment may be required in special qualification airspace.

8.3.2.1. Should any required equipment fail before entering such airspace, comply with FLIP restrictions or request a new clearance to avoid this airspace. **(T-1).**

8.3.2.2. Should any required equipment fail after entry into such airspace, immediately notify ATC and coordinate a plan of action. **(T-1).**

8.3.2.3. Document (AFTO Form 781A) malfunctions or failures of required equipment, including the failure of this equipment to meet tolerances. **(T-1).**

8.3.3. RNAV airspace/procedure restrictions.

8.3.3.1. Manual entry of waypoints using Latitude/Longitude or Place/Bearing is prohibited on any RNAV procedure. **(T-1).** RNAV point-to-point navigation, e.g. Navigation Reference System (NRS) waypoints, NAT tracks, remote oceanic navigation, etc. are the only times when Lat/Long entry is allowed for RNAV. **(T-1).**

8.3.3.2. Pilots will not change any RNAV database waypoint turn property from "no" to "yes" or vice versa. **(T-1).**

8.3.3.3. Waypoints may be deleted in order to comply with NOTAMs or ATC clearances, e.g. deleting the course reversal on an approach when cleared via a NO PT routing.

8.3.3.4. Altitude and airspeed parameters may be adjusted to match current NOTAMs, ATC clearance, or cold weather adjustments.

8.3.3.5. Encrypted PPS (MGPS) is authorized as primary navigation for civil navigation unless directed otherwise by SPINS, command authority, or host nation guidance for all phases of flight.

8.3.3.5.1. If MGPS cannot be properly verified with encrypted PPS via Technical Order guidance, then CGPS should be used as the primary navigation source.

8.3.3.5.2. When host nation directives are ambiguous, CGPS should be used as the primary navigation source.

8.3.3.6. RNAV procedures or routes requiring WAAS or LAAS equipment are not authorized; the C-17's GPS equipment does not have WAAS or LAAS capabilities.

8.3.4. RNAV SID/STAR restrictions.

8.3.4.1. There are cases where non-RNAV procedures have the same routing, NAVAIDs, and/or waypoints published as an RNAV procedure (RNAV in the title). AFMAN 11-217 may be misleading to crew actions in stating that underlying NAVAIDs must be monitored if available for stand-alone RNAV SID/STAR. First, do not assume the courses on the RNAV procedure are the NAVAID radials. Second, when flying an RNAV procedure, do not use radials and/or courses from a conventional non-RNAV procedure with the same routing to the RNAV procedure. **(T-1).** There are several technical reasons differences may exist. RNAV procedures do not put NAVAID frequencies and Morse code on the procedure for these reasons. Bottom line: When flying an RNAV procedure and RNAV capability is lost, notify ATC that RNAV capability is lost and request an alternate clearance. **(T-2).**

8.3.4.2. The use of non-USG developed STARS is authorized without TERPS review. The use of either the host nation sanctioned, or respective Jeppesen, STAR charts are authorized without further review. This does not alleviate pilots of the responsibility to check the Giant Report. **(T-2**). Additional guidance is found in the ASRR.

8.3.4.3. At least one GPS must be operational and updating the MC present position (MC PPOS) before departing on an RNAV departure. **(T-1).** Radio updating is not authorized as an update source on the ground prior to departing on an RNAV departure. **Exception:**

If GPS updating fails during takeoff, the takeoff and planned RNAV departure may be continued. RNAV guidance remains valid for up to fifteen minutes following failure. When able, follow flight manual Section III procedures after safely airborne regarding failure of RNAV components. **Note:** Complete GPS failure is indicated by a NAV MCD/GPS MCD cue with accompanying MCD messages (MGPS INOP and CGPS INOP).

8.3.5. RNAV/GPS Approach Restrictions

8.3.5.1. Aircrews may fly any procedure with "RNAV (GPS) RWY" in the approach title or those that have ONLY "GPS RWY" in the approach title. These are stand-alone GPS-based approaches. These approaches can be identified on approach plates by the presence of GPS waypoint depictions (black diamond waypoints). **Example:** "VOR or GPS-B" at Palm Springs (KPSP).

8.3.5.2. Instrument approach procedures titled "RNAV (RNP)" or "RNAV (RNP AR)" or RNAV procedures that have "Special Aircraft & Aircrew Authorization Required (SAAR)" statements in the profile view are not authorized. **(T-1).**

8.3.5.2.1. ICAO instituted a new naming convention for Performance Based Navigation (PBN) approaches that some countries have adopted. PBN approaches titled RNAV (GNSS), RNAV (GPS), RNAV (RNP) will transition to the title "RNP." RNAV (RNP) Authorization Required (AR – formerly SAAR) will be titled "RNP AR" in counties that adopt the new naming convention. For example, RNP RWY 23 is authorized, but RNP RWY 23 (AR) is not authorized.

8.3.5.3. GPS approaches are flown to non-precision MDA (LNAV MDA or S-xx) or circling minima only.

8.3.5.4. C-17 aircrews may fly published PBN transition to ILS final IAPs if available in the mission computer. That includes approaches with PBN initial, intermediate and/or missed approach segments. These IAPs must be extracted in their entirety (to include the missed approach segment) from the navigation database without alteration, and follow the same operational practices and procedures as RNAV (GPS) approaches. **(T-1).**

8.3.5.4.1. Each pilot must conduct a proper IAP review and brief how the approach will be flown to include transition to ground based navaids and if necessary back to PBN guidance. **(T-3).**

8.3.5.4.2. If the aircrew/aircraft is not capable of flying RNAV (GPS) approaches, the crew is authorized to fly the PN segmented approach provided they coordinate for vectors to final or alternate missed approach instructions as authorized by the approach procedure.

8.3.5.4.3. Aircrews are not authorized to fly PBN transition to final IAPs that include Radius to Fix (RF) legs. **(T-1).** These IAPs require A-RNP capability.

8.3.5.5. C-17 aircrews are not authorized to maintain overlay ground tracks based solely on GPS. **(T-1).** GPS overlay approach construction is subject to coding errors and may not provide course guidance over the proper ground track. These approaches can be identified on approach plates by the absence of GPS waypoint depictions (black diamond waypoints).

8.3.5.6. Accepting ATC vectors. Aircrews may accept ATC vectors to a published point on the approach or ATC vectors to intercept the final course. Direct-to function: if

established on vectors to intercept an RNAV course, crews may utilize the 1R LSK direct-to/intercept to waypoint function. Use the inbound course value for the intercept from the MC FPLAN page. Once crews confirm that the ND map displays their intended action, crews arm LNAV and ensure it is engaged. Crews will not descend to the next applicable altitude until established on a published segment of the approach. **(T-1).**

8.3.5.7. VNAV is not authorized between the FAF and missed approach waypoint. **(T-2).** MSN VNAV (MSN descent) may be used between the Initial Approach Fix (IAF) and Final Approach Fix (FAF). **(T-1).** However, crewmembers are reminded that the MSN VNAV algorithm remains a "dive and drive system" and may command descents greater than authorized during intermediate approach segments (TERPS criteria is based on a maximum descent of 500 ft/nm, approximately 1,500 VVI, between the IAF and FAF). Furthermore, MSN speeds may revert to tech order after vertical profile calculations. As a result, speed select mode (speed on thrust/pitch) and/or vertical speed mode (vertical speed command wheel) used in conjunction with MSN LNAV is the recommended mode for most RNAV approaches.

8.4. Enroute/Flight Progress.

8.4.1. Use all available FLIP enroute charts, and prior to departures and arrivals, terrain charts, to ensure navigational accuracy and terrain clearance. For non-RNP software aircraft, periodically crosscheck the navigation solution (MC FOM).

8.4.2. For waypoints entered using Lat/Long, both pilots will use the ND CHART format in conjunction with the DEFINE/REVIEW WAYPOINT pages to insure the proper coordinates were loaded for all points in the flight plan. **(T-2).**

8.4.3. If a revised clearance is received, revise the flight plan in the mission computer and both pilots review the revised route before executing the change. **(T-2).**

8.4.4. Flying In Polar Regions.

8.4.4.1. Because the C-17 does not rely on magnetic field sensors for heading determination, navigation in Polar Regions poses no significant difficulties. Magnetic and grid headings are provided for pilot selection by converting true heading information from IRU sources.

8.4.4.2. Magnetic variation information is stored as a look-up table in the IRU and provides variation data from 72°N to 60°S. No variation data is supplied above/below these latitudes. Refer to the T.O. 1-C-17A-1-2 for Polar Operations. Manual magnetic variation should only be selected when magnetic headings are flown.

8.4.4.3. Manual magnetic variation is not taken into consideration when displaying runways from the PERMANENT NAV DATABASE, as display logic assumes a zero magnetic variation. To get correct runway displays on the NAV display, create a new runway in the CUSTOM NAV DATABASE oriented to true or grid as applicable.

8.4.4.4. Whenever a magnetic heading is displayed, pilots see a jump in the heading scale as the magnetic variation is significantly changed. This occurs normally at 72°N/60°S or when manual magnetic variations are inserted into the MC. If the AP/FD is engaged in HDG or HDG HOLD modes while following this magnetic heading, the aircraft executes a turn in order to maintain the magnetic heading selected prior to the jump. These turns do

not occur if the heading reference for the pilot ID switch was in TRUE or GRID when the heading was selected on the AP/FD. No turns occur if the AP/FD is engaged in the MSN lateral mode when crossing 72°N/60°S.

8.4.4.5. Grid heading reference is provided to pilots with a mathematical relationship defined in USAF air navigation manuals using a grid chart conversion factor of 1.0. While grid heading is selectable for display anytime via the MFC panel, it is only accurate at high latitudes where the grid convergence factor is actually 1.0. Pilots should consider this heading accurate at the latitudes near and above 72°N/60°S. The message GRID MODE is displayed on the WAP when passing these latitudes for higher ones to indicate to the pilot that valid grid headings are available for navigation. If pilots have entered a manual magnetic variation as described above, the GRID MODE message is removed. Accurate grid headings are still available, but the MC interprets the pilot entered manual magnetic variation as a desire to fly magnetic headings, not grid headings.

8.4.4.6. The BDHI is oriented to magnetic headings. Grid reference is provided when GRID is selected on HDG REF SEL. As mentioned above, for latitudes above 72°N/60°S, the programmed magnetic variation is zero and the magnetic heading is incorrect; the BDHI essentially displays true headings. The VOR/TACAN/ADF needles still operate; the ADF continues to give relative bearing, and the VOR/TACAN needles are slaved to the correct radials. However, to determine correct magnetic headings for VOR/TACAN intercepts, input a manual magnetic variation if the stations are oriented to magnetic north. This is also true if trying to determine magnetic bearing from an NDB. If the VOR/TACAN/NDB is oriented to true north, then the magnetic variation needs to be zero for correct display on the BDHI.

8.4.4.7. For VOR and TACAN navigational aids, the course select knob on the CNC is consistent with the orientation of the NAVAID as defined in the NAV DATABASE. If the NAVAID is oriented to true, then a 300 course set in the CNC is a 300 true course; if the NAVAID is oriented to grid, then the course is a 300 grid course. Currently all NAVAIDs in the PERMANENT NAV DATABASE are defined as magnetic; pilots have to use the custom database to define a true or grid oriented NAVAID. Navigation position information is most easily interpreted when the displayed heading is consistent with the orientation of the NAVAID used (i.e., fly true headings when flying true TACAN radials, grid headings for grid courses, etc.).

8.4.4.8. For ILS approaches, the MC always assumes the course in the CNC to be magnetic. This has no effect on the ability of the aircraft to correctly fly the ILS, but is necessary for the MC to determine the ILS intercept angle and display NAV data. Pilots desiring to fly a magnetic ILS approach above 72°N/60°S should dial the magnetic course in the CNC and insert a manual magnetic variation in the MC. To fly a true ILS, pilots should dial the true course and ensure the MAG VAR is zero. Attempts to fly a magnetic ILS with incorrect magnetic variation should not cause problems once established on final; the intercept may be erratic and the NAV display shows a heading different from the ILS course equal to the error in magnetic variation as the aircraft tracks the ILS beam (no wind situation). Grid only ILS procedures are not supported; pilots convert the grid ILS approach course in the instrument approach procedure to a magnetic or true course, then ensure the correct MANUAL MAG VAR is inserted in the MC (local terminal magnetic variation for MAG ILS, zero magnetic variation for true ILS).

8.5. Low-Level Navigation. Threat and emission control requirements permitting, use all available aids (i.e. mission computer data, navigational aid fixes, map reading) to remain position oriented.

8.5.1. While aircraft systems provide a self-contained adverse weather, day/night, worldwide navigation capability, pilots assume ultimate responsibility for enroute navigation, terrain avoidance, and time control. During low level operations, attention shall be focused outside the aircraft, emphasizing threat detection and situational awareness. **(T-2).** Limit duties that distract attention from outside the aircraft to mission essential items only.

8.5.2. A navigation display (ND) map format shall be displayed on at least one MFD at all times. **(T-2).**

8.5.3. Time of Arrival (TOA) control is primarily accomplished by airspeed adjustments.

8.5.4. Means of Navigation.

8.5.4.1. One radar altimeter will be operational for all low levels. **(T-2).** The mission computer navigation solution is the primary means of navigation backed-up with map reading, on VFR low level routes. If conditions permit, ground-based navigational aids can be used as additional information sources.

8.5.4.2. The mission computer is the primary means of route navigation in IMC. Onboard radar, ground-based radar, and/or bearing/distance fixes should be used as backups.

8.5.5. Low level modified contour flight may result in small deviations above and below the base altitude for smoothness of flight.

8.5.6. Altimeter Settings. In the absence of reported or forecasted barometric setting, crews may use the MC GPS barometric setting with the following restrictions:

8.5.6.1. Day VMC. Crews will use visual references to ensure terrain and obstacle clearance. **(T-3).**

8.5.6.1.1. Barometric altitudes (MSA, ESA, etc.) will be increased by 1,000-feet. **(T-2).**

8.5.6.2. Night or IMC. Crews will add 1,000 feet to their planned minimum altitudes. **(T-2).**

8.6. Mission Computer Approaches.

8.6.1. The C-17 mission computer approach uses the MC APPROACH page of the mission computer. It only mathematically derives a final approach course and glide path from default or pilot input data. **Note:** Reference AFTTP 3-3.C-17 for techniques on programming Mission Computer approaches.

8.6.2. In a contingency, the crew will be provided an approved (TERPS'ed) approach procedure leading to a mission computer approach final approach fix. **(T-2).** All course data and altitude restrictions required to program the approach in the mission computer will be included on the approach procedure. **(T-2).** This will include any high-precision waypoints, weather minimums, and missed approach instructions required to safely execute the approach. **(T-2).**

8.6.3. Restrictions on Mission Computer Approaches.

8.6.3.1. Mission computer approach procedures in IMC will only be used when no other published approach procedure is available and with specific authorization from MAJCOM/A3. **(T-2).** All crews are authorized to use these procedures for training in VFR conditions IAW AFI 11-202V3, *General Flight Rules*.

8.6.3.2. Mission computer navigation accuracy.

8.6.3.2.1. RNAV approaches require an RNP value of 0.3 nm from the FAF to the Runway (unless non-std TERPs values used).

8.6.3.3. It is highly recommended that the approach be flown with the autopilot coupled.

8.6.3.4. Weather minima for approved MC approaches will be no lower than 600-2. **(T-2).**

8.6.3.5. Ensure LDI does not exceed ½ full scale deflection.

8.6.3.6. Navigation System Malfunctions.

8.6.3.6.1. Unless the runway is in sight, execute the missed approach procedure if "UNABLE RNP" or "OVRFLY NOT POSSIBLE" appears on the MCD. **(T-1).**

8.6.3.7. All of the waypoints required for flying the approach and missed approach must exist in the current navigation database. If the waypoints are not in the permanent navigation database, aircrews will be provided the required waypoints to be loaded electronically into the custom navigation database. **(T-2).** Aircrew will not manually enter or alter the latitude or longitude coordinates for any portion of the approach, or missed approach. **(T-1).**

8.6.3.8. Enter all of the waypoints for the approach up to the FAF in the primary flight plan. **(T-2).**

8.6.3.9. Enter all of the waypoints for the missed approach, starting with the missed approach waypoint (MAWP), in the secondary flight plan. **(T-2).** Special attention should be paid to whether each waypoint is an "over fly" or "under fly". The MAWP is usually an "over fly" waypoint.

8.6.3.9.1. Secondary FPLAN will be displayed on at least one ND Map display. **(T-2).**

8.6.3.10. Both pilots will review the entire procedure in the mission computer, verifying the coordinates and the MFD map display for accuracy, prior to commencing the approach. **(T-2).** If any portion does not agree with the approved procedure, the approach will not be flown. **(T-2).**

8.7. Mission Computer Approach Planning Guidance. Planners will reference AFJMAN 11-226, *United States Standard for Terminal Instrument Procedures (TERPS)* and/or AFMAN 11-2C-17, Volume 3, Addenda-B, *C-17 Special Operations (FOUO)*. **(T-1).**

Chapter 9

AIRCREW MAINTENANCE SUPPORT PROCEDURES

9.1. General. This chapter contains aircrew procedures not contained in the flight manual, other portions of this manual, or other publications.

9.2. Responsibilities. Aircrew may assist the normal maintenance function when critical contingency tasking dictate their use, provided this action does not impact crew duty and crew rest limits specified in **Chapter 2** of this manual.

9.3. Refueling/Defueling.

9.3.1. Aircraft Refueling. Aircrews normally only refuel in cases when maintenance support is not readily available and the mission would be delayed. If the Fuel Manifold Drain cannot be drained (lack of PPE/fuel container), make an AFTO Form 781A red diagonal entry stating why the step could not be completed and accomplishment causes delay. If aircrew refueling is required at a base with AMC support, the PIC will submit an AMC Form 54, describing the circumstances. **(T-3).**

9.3.2. Refer to T.O. 1C-17A-1, T.O 1C-17A-2-12JG-28-1 and T.O. 1C-17A-2-12JG-28-2 for refueling/defueling procedures. Aircraft to Aircraft defueling procedures are only authorized to be performed by MAJCOM certified personnel. **(T-2).**

9.3.3. Specialized Fueling Operations. Specialized Fueling Operations require additional certifications. For Specialized Fueling Procedures reference AFI 11-235 Specialized Fueling Operations.

9.3.4. Concurrent Servicing operations are not required on MAF aircraft unless refueling/defueling with JP-4, loading/downloading flares, or servicing LOX. Simultaneous servicing of fuel while loading passengers/patients, cargo (including hazardous or explosive), performing maintenance, aircrew members performing inspections, or operating aircraft systems is considered to be a normal fuel servicing operation.

9.3.5. If required, refer to T.O. 00-25-172, Ground Servicing of Aircraft and Static Grounding/Bonding.

9.4. Maintenance Monitor Panel. Aircrews will not erase any fault unless specifically directed by maintenance. (T-2).

9.5. Aircraft Servicing Requirements. When adequate maintenance support is not available, the aircrew may need to perform certain maintenance tasks. Use the job guides (JG) in **Table 9.1**. If aircrew servicing is required at a base with AMC support, the PIC will submit an AMC Form 54 describing the circumstances. **Note**: Aircrews should consult a qualified maintenance facility when questions/concerns arise as to performing any maintenance task. **(T-2).**

Table 9.1. Job Guides.

TO Number	Title
1C-17A-2-10JG-10-1	Ground Handling—Parking/Mooring
1C-17A-2-10JG-30-1	Ground Handling—Quick Turn-Around
1C-17A-2-10JG-50-1	Ground Handling—Launch
1C-17A-2-10JG-60-1	Ground Handling—Servicing Equipment Positioning
1C-17A-2-10JG-70-1	Ground Handling—Mission Reconfiguration of Cargo
1C-17A-2-12JG-28-1	Servicing—Fuel
1C-17A-2-12JG-28-2	Servicing—Fuel
1C-17A-2-12JG-29-1	Servicing—Hydraulic
1C-17A-2-12JG-79-1	Servicing—Engine Oil
1C-17A-2-40JG-20-1	System Integration—Displays (BIT)
1C-17A-2-00GV-00-1	General Vehicle Manual
1C-17A-2-1	Aircraft Cross Servicing Guide
1C-17A-6	Inspection Requirements Manual

9.6. Aircraft Recovery Away from Main Operating Base (MOB). When an aircraft lands at a base other than the MOB, a crew chief should accompany the aircraft. The PIC is responsible for ensuring the aircraft is turned to meet subsequent mission taskings. If qualified maintenance specialists are unavailable, the aircrew is responsible for turning the aircraft to meet subsequent mission taskings.

9.6.1. Recovery items the aircrew may be responsible for include, but are not limited to, the following:

9.6.1.1. Parking and receiving.

9.6.1.2. Aircraft servicing.

9.6.1.3. Supervision of minor maintenance within local capability.

9.6.1.4. Minor configuration changes to meet mission tasking.

9.6.1.5. Securing the aircraft before entering crew rest.

9.6.1.6. Coordinating aircraft security requirements.

9.6.1.7. AFTO Form 781-series forms maintenance.

9.6.2. In all cases where aircrews service the aircraft without qualified maintenance specialist assistance, comply with procedures in this chapter. **(T-2).**

9.6.3. Aircrews are not qualified to accomplish the required ground inspections. In those instances where maintenance personnel are not available, the aircrew will enter a red dash symbol in the AFTO Form 781A, updating current status and enter a red dash symbol and a discrepancy that reflects that the applicable maintenance inspection (i.e. pre-flight, thru-flight, basic post-flight) is overdue. **(T-2).** Reference TO 00-20-1/AMCI.

Chapter 10

CARGO AND PASSENGER PROCEDURES

10.1. General. The loadmaster coordinates loading or offloading with air terminal operations or the shipping agency; plans loads; provides in-flight services to passengers, and supervises onloading or off-loading operations. If airdrop qualified, the loadmaster participates in the aerial delivery of equipment, supplies and personnel.

10.2. Transportability Problem Items. The loadmaster is the on-scene expert for load planning and accepting cargo for airlift. Some loads are not specifically detailed in applicable directives and require the loadmaster to use their best judgment based on training, experience, and knowledge to determine the best and safest method of loading the cargo. When difficulties arise, they should seek the advice of other personnel (i.e., squadron, group, wing or MAJCOM Stan/Eval personnel.)

10.2.1. **An air transportability problem item is any item in its proposed shipping configuration which may be denied transport aboard US Air Force cargo aircraft due to excessive size, weight, fragile or hazardous characteristics, lack of adequate means for handling, restraint, or a requirement for special support equipment.**

10.2.2. Items defined as transportability problem items should be coordinated thru ASC/ENFC prior to being offered for air shipment. Coordination for certification is the shipper's responsibility. Loadmasters are not responsible for determining if an item requires certification.

10.2.3. In addition to the procedures/limitations listed in T.O. 1C-17A-9, *Loading Manual*, the following should be considered when determining the loadability of cargo:

10.2.3.1. Any vehicles, including any additional cargo they contain, must be fully restrained. **(T-3).** Loose items such as those listed below shall have provisions to be secured to the frame of the vehicle or they will be secured separately to the floor: **(T-2).**

10.2.3.1.1. Spare wheels, tools and tool boxes, towing chains, pinch bars, etc.

10.2.3.1.2. Bulldozer blades and push arms.

10.2.3.1.3. Cranes or booms on wrecking trucks, etc.

10.2.3.1.4. Dump truck bodies and other hydraulic or mechanical lift mechanisms.

10.2.3.1.5. Machines and tools in shop trucks, shelters, and containers.

10.2.3.2. Commercial vehicle axle weights should be less than or equal to 80 percent of the manufacturer's gross weight rating. This information is normally found on the vehicle data plate. If sleeper shoring is used under the frame, the item may be airlifted at weights up to 100 percent of the manufacturer's gross weight rating.

10.2.3.3. Equipment must have a suitable number of tiedown provisions to allow for restraint to the aircraft using on-board tiedown devices. **(T-1).** Examples of such tiedown provisions are vehicle frames, axles and crossmembers, pintle hooks, and cut-outs or other openings in structural members. Tiedown rings on non-military items (commercially manufactured items) should not be used unless the rating is provided. If tiedown rings are

not present or rating available, restrain the vehicle using largest frame components, preferably at longitudinal main frames adjacent to lateral cross members.

10.2.3.4. All accompanying items must be restrained to meet 3.0G forward, 1.5G aft and lateral, and 2.0G vertical. **(T-1).** In addition, stored or installed equipment (air conditioners, storage boxes, etc.), must be capable of withstanding a 4.5G down load. **(T-1).**

10.2.3.5. Enclosed items (airtight containers, on-board tanks, etc.) shall be designed with pressure relief devices or shall be configured in a way to allow for aircraft cabin pressure changes. **(T-1).**

10.2.4. The following items should be carefully considered before loading if not accompanied by an AFLCMC/EZFC (ATTLA) Air Transport Certification, or identified in T.O. 1C-17A-9.

10.2.4.1. Any type of watercraft or fixed-wing/rotary-wing aircraft.

10.2.4.2. Items designed to be loaded directly into the aircraft rail system.

10.2.4.3. Items with questionable structural integrity or significant damage to the frame and/or structural components.

10.2.4.4. Equipment that is designed to be occupied during any phase of flight.

10.2.4.5. Any item that operated during flight (portable command centers, radios, transmitters, refrigerators, etc.)

10.2.4.6. Items connected to the aircraft (vents, electrical outlets, antennas, etc.)

10.2.5. If the ability to restrain an item or its structural integrity is questioned, it will not be loaded. **(T-2).** If there is any question as to whether an item meets air transportability requirements contact ATTLA at; ASC/ENFC (ATTLA), 2530 Loop Road West, Wright-Patterson AFB, OH 45433-7101; (937) 255- 2330/2547; or visit the website at: **https://intelshare.intelink.gov/sites/attla/**

10.3. Emergency Exits and Safety Aisles. A clear unobstructed path must be maintained in case of an emergency evacuation of personnel. (T-1). **Loose equipment, crew or passenger bags will not be secured in a manner that will impede the use of emergency exits.** (T-2). **No part of the cargo load will extend over the edge of the walkway.** (T-2). Exception: **Equipment such as spare tires, mirrors, etc., protruding from rolling stock may extend over the walkway. Palletized cargo may extend beyond the vertical stacking line of the pallet only if specifically authorized in the loading manual or a load certification letter.**

10.4. Pre-Mission Duties.

10.4.1. Cargo Missions. The loadmaster will coordinate with aerial port personnel to establish loading times. **(T-2).** Loading times that differ from the normal pre-departure sequence of events will be established, with PIC coordination, before the loadmaster enters crew rest. **(T-2).** Loading time is governed by the type of load and complexity of loading procedures (bulk, palletized, etc.) not by port saturation or management of aerial port workload levels. When reporting for duty, the loadmaster checks in with the air terminal operations center or other designated location to obtain load brief and assist in load planning as required.

10.4.1.1. Duty Loadmaster Operations. Duty loadmasters are used as a means of flow control at stations with limited aerial port personnel, when units are deployed as part of an Expeditionary Airlift Squadron (EAS) or a tactical/contingency operation. Duty loadmasters do not relieve the primary aircrew loadmaster(s) of their duties. Duty loadmasters ensure items loaded on aircraft do not exceed aircraft limitations and adequate restraint is applied to cargo to prevent movement. Duty loadmasters are not required to restrain cargo for flight limits. Duty Loadmasters will accomplish an Exterior and Interior Safety Inspection, Basic Aircraft Pre-flight and all appropriate loading preparation checklists prior to conducting loading operations. **(T-2).** After completion of aircraft loading, duty loadmasters will accomplish the Before Leaving Aircraft Checklist unless maintenance personnel remain at the aircraft to monitor operating aircraft systems. **(T-2).** Primary aircrew loadmaster(s) will complete all pre-departure checklists to include the After Loading General Checklist. **(T-2).**

10.4.1.1.1. Upon arrival at an aircraft where loading operations are being directed by a duty loadmaster, the primary loadmaster will coordinate with the duty loadmaster on assumption of direct loading supervision. **(T-2).**

10.4.1.1.2. Aerial Port Expediter (APEX) Loading Operations. APEX is an aerial port loading program directly managed and supervised by HQ AMC/A4TC. It provides aerial port management the flexibility to determine the best time to on/offload aircraft and the ability to evenly distribute port workloads. It does not serve as an aircrew enhancement or alleviate the loadmaster's responsibility to on/offload aircraft.

10.4.1.1.2.1. APEX Load directors are qualified to on/offload all types of cargo (except airdrop equipment), operate the aircraft winch, cargo door, ramp and struts without the presence of an aircraft loadmaster. A maintenance representative must be present at the aircraft during APEX operations, load directors are not authorized to apply/remove aircraft power or monitor aircraft operating systems. **(T-2).**

10.4.1.1.2.2. Load directors are required to ensure restraint of cargo meets flight criteria. Load directors will accomplish a basic cargo compartment inspection IAW current APEX guidance and appropriate loading preparation checklist prior to conducting loading operations. **(T-2).** APEX operations do not alleviate the loadmaster from accomplishing applicable checklists.

10.4.1.1.2.3. Load directors have overall control until relieved by the outbound loadmaster(s). A coordination briefing is required prior to the loadmaster assuming overall control.

10.4.1.1.2.4. Loadmasters who need on/offloads for training or evaluations should notify ATOC prior to entering crew rest. ATOC should make every effort to accommodate the request.

10.4.1.1.2.5. Loadmasters treat APEX loaded aircraft like any duty-loaded or staged aircraft. Any cargo discrepancies that cannot be corrected by the loadmasters in a timely manner will be reported to ATOC. **(T-2).** Forward negative APEX trend data to AMC/A3VX through Stan/Eval channels. **(T-2).**

10.4.1.2. Load Data Information (Applicable to AFRC/ANG completing 618 AOC (TACC)-directed mission). At stations where there is no mobility air transportation

function, the aircrew will collect the required load information on each leg, and submit it to the first station, which has such a function. **(T-2).** The report will be submitted on AF Form 4075, *Aircraft Load Data Worksheet*. **(T-2).**

10.4.1.2.1. Aircrew will have access to all cargo containers placed on AMC aircraft except when accompanied by a letter signed by HQ AMC/A3 or HQ AMC/A4TC for protected or sensitive shipments. **(T-1).** Even with an exception letter from HQ AMC access to sealed or locked cargo must be possible in the event of an emergency. **(T-2).**

10.4.1.2.2. Pre-cleared containers (regardless of size) will not be sealed with bolt-type seals and offered for air shipment. **(T-2).** Only easily broken (without specialized tools) seals are authorized for use and include Ball-type, Cable seals, or plastic seals. The intent of the seal is to detect pilferage or tampering, not prevent it. Additionally, containers will not be locked with key-type or combination padlocks unless the crew has access to keys/combination. **(T-2).**

10.4.1.2.3. The Loadmaster is the final on-scene authority to determine if seals/locks will be removed for inspection. **(T-2).** Every effort should be made to maintain pre-clearance integrity.

10.4.1.2.4. Customs pre-clearance is not synonymous with Joint Inspection (JI),therefore, if cargo has been Joint Inspected and properly documented (DD forms 2133 and/or 2855), the need for interior inspection is decreased but not eliminated.

10.4.1.2.5. Procedures for A3 Exemptions to these requirements are outlined in AMCI 24-101Vol.11. This exemption is typically used for classified/sight sensitive cargo; however, the exemption does not waive "safety of flight."

10.4.1.3. Known tiedown equipment deficiencies.

10.4.1.3.1. Davis 08/08 CGU-3/E 25K tiedown device. Prior to use, ensure tiedown devices with manufacture date of "08/08" have a repair kit installed. **(T-2).** Repair kits consist of a keeper plate on top side of release handle attached with three Philips head screws.

10.4.1.3.1.1. Upgrade kits are needed to correct the locking interface operation for these devices. **(T-2).** Any devices that have not been repaired with these kits are not authorized for use. **(T-2).** If found, remove the device from service.

10.4.1.3.1.2. The following information can be located on the release handle of the effected devices: NSN 1670-00-212-1150, manufactured by Davis Aircraft Products Incorporated under contract SPM4A7-08-D-0160, with a manufacture date of 08/08.

10.4.1.3.2. Peck and Hale CGU-4/E 10K tiedown device. The chain can be pulled out of clasp on these devices once locked. This can be accomplished by pulling on the excess chain (free end) while locked into the chain pocket of the device.

10.4.1.3.2.1. Inspect for the following condition after applying tension on the device: ensure chain is properly locked into the chain pocket and quick release lever is not oriented in a downward position; pull on excess chain (free end). **(T-2).** If chain comes out of the pocket, remove the device from service. **(T-2).**

10.4.1.3.3. Davis CGU-4/E 10K device. The chain can be pulled out of the pocket when significant slack is present. This can be accomplished by pulling the loaded end of the chain away from the device, while locked into the chain pocket. The defect is amplified when the chain pocket/quick release lever is facing down. Based on a risk analysis by WR-ALC 642 CBSG, the chance of failure is minimal when the device is under tension and the chain pocket/quick release lever is not oriented in a downward position.

10.4.1.3.3.1. Inspect for the following condition after applying tension on the device: ensure chain is properly locked into the chain pocket and quick release lever is not oriented in a downward position; pull on the loaded end of the chain. **(T-2).** If chain comes out of the pocket, remove the device from service. **(T-2).**

10.4.2. Missions with Passengers. C-17 missions can release up to 20 seats for passengers with checked bags without a baggage pallet/position. Additional seats may be released for passengers that have "Hand-Carried-Only baggage" that does not exceed the following dimensions: Length 21", Height 12.5", Width 13" and the Allowable Cabin Load (ACL) is not exceeded and cargo configuration is maintained. **(T-2).**

10.5. Passenger Handling. The PIC will have final authority and may bump Hand-Carry-Only passengers that were selected if the baggage limitations listed in **paragraph 10.4.2**, are not adhered to. (T-2). If a pallet is not available, the loadmaster has the option to floor load passenger baggage in the open pallet position.

10.5.1. When passengers are onboard, loadmasters occupying the forward loadmaster station will not position the seat or be distracted in a manner that would prevent them from immediately viewing or assisting passengers. **(T-2).**

10.5.2. Body Fluid/Bio-Hazard Clean-Up:

10.5.2.1. Aircrew members are not trained, immunized or properly equipped to clean Body Fluid/BioHazard. Due to the potential health risk to passengers and crew, the loadmaster should request the individual clean or contain all body fluids and waste to the best of their ability. If practical, the loadmaster should:

10.5.2.1.1. Cordon off the contaminated area.

10.5.2.1.2. Place paper towels or other absorbent material on the body fluids/waste to minimize the spill area.

10.5.2.1.3. Place all contaminated material into sealed bag. **Note:** Use vinyl or nitrile gloves and safety goggles, if available, when handling any items contaminated with body fluids/waste.

10.5.2.1.4. Avoid touching the mouth or face area with soiled hands or gloves. Wash hands thoroughly with soap and water after cleaning or clean hands with an alcohol-based hand gel (at least 60% alcohol) when soap and water is not available.

10.5.2.1.5. Annotate type of body fluid/bio-hazard spill location in AFTO Form 781A.

10.5.2.2. When there are bio-hazard spills during flight, aircrew should notify Bio Environmental personnel.

10.6. Enroute and Post-Flight Duties.

10.6.1. At stations where a crew change is made and loading or offloading is required, the inbound loadmaster is responsible for offloading the aircraft. **(T-3).** The outbound loadmaster is responsible for planning and loading the outbound load. **(T-3).**

10.6.2. At crew stage points, brief relief personnel about passenger and aircraft equipment, any missing items, the location of through cargo, mail and baggage, and any information pertinent to through passengers. **(T-3).** Point out cargo requiring special consideration (hazardous material, perishables, etc.). If unable to conduct a face-to-face briefing, leave written instructions with the cargo manifest or local C2. **(T-3).**

10.6.3. Assist passengers in deplaning. If BLUE BARK, Distinguished Visitors (DVs), COIN ASSIST, or couriers are onboard, the loadmaster informs the traffic or protocol representative respectively. **(T-3).** Refer to the General Planning (GP) Flight Information Publication (FLIP) for DV codes.

10.7. Loaded Weapons. Weapons are considered loaded if a magazine is installed in the weapon. This applies even though the magazine is empty. Normally, personnel are not permitted to carry their basic combat load or individual issue of hazardous materials removed from its required packaging. See AFMAN 24-204, for procedural exceptions in support of the DoD, Federal agencies, and allies providing sustained, immediate, and responsive air movement, and delivery of personnel and hazardous material to, within, or from objective areas under tactical, contingency, or emergency conditions.

10.8. Weight and Balance. Accomplish weight and balance for this aircraft according to T.O. 1-1B-50, *Weight and Balance*, T.O. 1C-17A-5-2, *Loading Data*, and Addendum A of this manual. **(T-1).** The unit possessing the aircraft maintains the primary weight and balance handbook containing the current aircraft status and provides a supplemental weight and balance handbook for each aircraft. **(T-2).**

10.8.1. The supplemental handbook will include T.O. 1C-17A-5-2, *Weight and Balance Manual*, AFMAN 11-2C-17 V3 Addenda A, *C-17 Configuration/Mission Planning*, sufficient copies of DD Form 365-4, *Weight and Balance Clearance Form F—Transport/Tactical*, and a certified copy of the current DD Form 365-3, *Chart C, Basic Weight and Balance Record*. **(T-2).** Chart C will include the aircraft's basic weight, basic moment, and center of gravity. **(T-2). Exception:** T.O. 1C-17A-5-2 and AFMAN 11-2C-17 V3 Addendum A may be excluded from the supplemental handbook if carried in digital format.

10.8.2. The weight and balance section of the unit possessing the aircraft will provide the information required to maintain current and accurate documents to the appropriate agency. **(T-2).**

10.8.2.1. Ensure a sufficient amount of printer paper is onboard to complete the mission.

10.9. Rucksacks. The following procedures apply to loading of rucksacks.

10.9.1. In all cases, rucksacks will be loaded on the same aircraft as the individual. **(T-2).**

10.9.2. Transported units must ensure that adequate space is provided on the load plan and aircraft to ensure all personnel have an unobstructed path to evacuate the aircraft during an emergency. **(T-1).**

10.9.3. During administrative deployments, rucksacks may be loaded on deploying vehicles, palletized, or floor loaded. Placing rucksacks on the aircraft floor may increase loading and

offloading times. Also, this method may require more space and reduce the number of personnel or equipment airlifted.

10.9.4. During tactical deployments into a FOB/OB, rucksacks not loaded on vehicles are carried by the individual onto the aircraft. Normally, floor space will be allocated on the aircraft load plan for floor loading rucksacks. **(T-2).**

10.9.4.1. When a flight is planned for a short duration, the following procedures apply:

10.9.4.1.1. The troops may wear the rucksacks in the seat provided the seats are placed in the paratroop configuration.

10.9.4.1.2. All troops must have quick release straps on their rucksacks. **(T-2).**

10.9.4.1.3. Brief troops to leave their rucksacks on the seat if an emergency evacuation is necessary. **(T-2).**

10.9.4.2. The following procedures apply to transporting hazardous materials in rucksacks:

10.9.4.2.1. Personnel will only be permitted to carry their basic combat load or individual issue of hazardous material when they will engage an enemy force immediately upon arrival. **(T-2).** Personnel may retain small arms ammunition (cartridge for weapons, DOT 1.4) and nuclear, biological, and chemical equipment as long as it is retained in a carrier (i.e., bandoleers, pouches, bags). Weapons will remain clear until the aircraft has landed or as directed by the loadmaster. **(T-2).**

10.9.4.2.2. Protect munitions and other hazardous materials placed in rucksacks, field packs, or other authorized containers, removed from their shipping container from accidental malfunction. For airland troops and airdrop troops who are not rigged prior to takeoff, all carriers will be consolidated in one central location on the aircraft (as directed by the loadmaster) and distributed to personnel after landing. **(T-2).** Paratroopers rigged prior to takeoff may retain individual carriers containing hazardous materials.

10.9.4.2.3. The troop commander or load team chief briefs the loadmaster concerning the individual issue of hazardous materials. The loadmaster will brief the PIC. **(T-2).**

10.9.4.2.4. Hazardous materials identified for sustainment must be prepared and certified according to AFMAN 24-204. **(T-1).**

10.10. Cargo and Material Handling Equipment (MHE) Issues.

10.10.1. ATOC will coordinate with the shipper or maintenance to connect/disconnect cargo venting systems. **(T-2).**

10.10.2. Loadmasters are not authorized to connect/disconnect cargo venting systems. **(T-1).**

10.11. Procedures for Loading Hazardous Cargo. Hazardous materials and cargo falls into many categories. Handle or transport these items with caution.

10.11.1. Hazardous materials and cargo not properly packaged and documented in accordance with AFMAN 24-204 will be rejected for air shipment. **(T-1).**

10.11.2. Load all hazardous material to permit easy access in-flight without moving other cargo. **(T-2).** Load jettisonable hazardous material to facilitate jettisoning. **(T-1).**

10.11.3. Hazardous materials shipped in a freight container (ISU-90, conex etc.). Load plans must allow in-flight access in event of an emergency, or hazardous materials will be removed from the container. **(T-2).** Some containers have built-in "HAZMAT" access panels; however, when these containers are utilized, any hazardous materials must be positioned to permit access through the panel. **(T-2).** Hazardous materials in the upper compartment of the container are inaccessible unless the adjacent pallet position is left empty to facilitate opening the doors. If the person responsible for the container is not on board, the key or combination for locks on containers must be on the container adjacent to the lock or in the cargo manifest. **(T-2). Exception:** See AFMAN 24-204 for hazardous cargo not required to be accessible in-flight.

10.11.4. Lithium Batteries and Pyrotechnic Material (Class/Division 1.3G). Aircraft halon fire extinguishers only help reduce the intensity of the fire until the lithium and pyrotechnic material expends itself. The prohibited transportation of damaged lithium batteries and strict adherence to packaging requirements has greatly reduced the inherent risks associated with shipment.

10.11.4.1. Load planners shall position primary lithium battery and pyrotechnic material shipments on aircraft load plans in a manner that will permit easy access and jettisoning in-flight without moving other cargo. **(T-1).** Any agency providing hazardous cargo briefings will ensure aircrew personnel are aware of lithium battery and pyrotechnic material quantity and location aboard the aircraft. **(T-2).**

10.11.4.2. On/Offloading Procedures. Load teams should use extreme caution when handling or transporting these items and ensure hazard markings and warning labels are visible to aircrew and load team personnel. To mitigate any hazard posed by an in-flight incident, this cargo shall be positioned on the aircraft in a manner that facilitates immediate access by aircrew personnel. **(T-2).**

10.11.4.3. Inflight/Emergency Procedures. Loadmasters shall conduct frequent in-flight cargo checks to monitor primary lithium battery and pyrotechnic material shipments. **(T-2).** If a fire is suspected or indicated, loadmasters notify the PIC and complete the applicable aircraft emergency procedures. Use aircraft Halon fire extinguishers to slow down the thermal runaway and prevent the spread of fire to other cargo. Jettison if practical. **Note:** Do not use water as a fire suppression system for lithium batteries or pyrotechnic material. Water presents a hazard to electronic equipment and, in less than a large quantity, is ineffective.

10.12. Silver Bullet Command and Control Module (CCM).

10.12.1. When the Silver Bullet is assigned to a mission, the 618 AOC/XOOO Special Assignment Airlift Missions (SAAM) planners will ensure the party is briefed on the risk for in-flight occupancy. **(T-2). Note:** Due to lack of rigorous safety certification, AMC does not endorse occupancy of the Silver Bullet CCM during takeoff, landing, air refueling, or periods of moderate turbulence. If passengers occupy the Silver Bullet during these periods they do so at their own risk.

10.12.2. PICs are responsible for personally briefing the DV Contact and DV party (as applicable) on takeoff, landing, air refueling and turbulence occupancy restrictions. **(T-2).** The PIC retains overall authority to remove personnel from the Silver Bullet CCM when passenger safety may be jeopardized (in-flight emergency, combat threat environments, etc.)

10.12.3. PICs will ensure all crewmembers and passengers are briefed on: **(T-2).**

10.12.3.1. Personnel Occupancy Limit (10 personnel total.)

10.12.3.2. Aircraft Emergency Procedures.

10.12.3.3. Emergency Procedures specific to the Silver Bullet.

10.12.4. An Emergency Passenger Oxygen System (EPOS) and a life vest (when required) will be pre-positioned for every occupant. **(T-2).**

10.12.5. In the event of a loss of cabin pressurization or smoke/fumes, Silver Bullet occupants shall don EPOS and evacuate the Silver Bullet CCM. **(T-1).** After all occupants egress the Silver Bullet, electrical power should be removed.

10.12.6. The Silver Bullet/Steel Eagle wireless router and communications equipment shall be turned off during air refueling operations. **(T-2).**

10.13. Senior Leader In-Transit Conference Capsule (SLICC) and Senior Leader In-Transit Pallet (SLIP).

10.13.1. Only qualified SLICC maintenance personnel will install/remove the SLICC vestibule and connect/disconnect SLICC electrical power. **(T-2).**

10.13.1.1. ADS palletized seats or other cargo will not be loaded immediately forward of the SLICC Conference Capsule. **(T-2).** Maintain a clear forward exit path from the Conference Capsule's forward exit door. **(T-2).**

10.13.2. A maximum of four operational SLIPS may be airlifted on a single aircraft. **(T-2).**

10.13.2.1. When multiple occupied SLIPS are used on the same aircraft, all SLIPS should be loaded into the same side of the logistics rails to simplify the inter-SLIP electrical connections.

10.13.3. If passenger restraint is required during turbulence, passengers are limited in number to five in the conference capsule due to availability of seat belts. **(T-2).**

10.13.4. The SLICC Berthing Capsule shall not be occupied during critical phases of flight (takeoff, landing, and aerial refueling). **(T-2).**

10.13.5. Passengers may occupy all seats on the SLIP during all phases of flight.

10.13.5.1. Seats must be facing forward or aft for takeoff and landing. **(T-1).**

10.13.5.2. Each seat will be equipped with an EPOS and a life vest (when required). **(T-2).**

10.13.6. SLICC modules power can be shut off immediately in the event of an emergency by pressing the red emergency shutdown switch on either the external power distribution panel or internal operator control panel of each module. Aircrews will familiarize themselves with the location of these emergency shutdown switches prior to transporting passengers in the SLICC modules. **(T-2).**

10.13.7. An emergency key located in a pouch by each entry door is available for use by aircrew personnel in the event that an emergency situation would require immediate access to a locked module.

Chapter 11

FUEL PLANNING AND CONSERVATION

11.1. General. This chapter provides fuel planning procedures for all C-17 missions including flight managed and local missions. Missions should be planned at altitudes, routes, and airspeeds to minimize fuel usage.

11.1.1. Fuel Reserves.

11.1.1.1. **Table 11.1** shows Identified Extra Fuel additions for mission planning.

Table 11.1. Identified Extra Fuel.

THUNDERSTORMS Corrections are not cumulative Use only the highest applicable correction	Isolated - 1,300 lbs. Few - 2,500 lbs. Scattered or Numerous - 5,000 lbs.
ICING Corrections are cumulative Add fuel for forecast or actual conditions	Departure or Landing - 1,100 lbs. (min)/2,200 lbs. (max) Enroute - 1,100 lbs.
ATC Altitude Restrictions (1) (2) Applicable for airfields listed in the Flight Planning Fuel Policy Letter on the EFB.	Hold Down – 4,500 lbs Early Descent – 4,500 lbs
ENVIRONMENTAL HI FLOW	100 lbs/hour
GROUND OPERATIONS/ERO	100 lbs/minute
KNOWN HOLDING DELAYS	200 lbs/minute of expected delay
Notes: (1) Hold down fuel is added as a departure bias and is calculated as if it is burned upon reaching the top of climb. (2) Early descent fuel is added as an arrival bias and is calculated as if it is burned on the last leg of the flight plan.	

11.1.1.2. 2,200 lbs of fuel is calculated by MAFPS and included in the "Unusable Fuel" block for Fuel Totalizer bias.

11.1.1.3. FMs will calculate the MAFPS ASR with a fuel burn bias, specific to aircraft tail number. **(T-2).** This bias will be annotated on the MAFPS ASR as "DGDP" (Degrade Percentage). **(T-2).** Enter the Tail Specific Fuel Bias (Fuel Flow Factor) value, as found on the C17/CL_Inserts fuel bias list into the MC as a Fuel Factor (FF LSK 6L on the

Performance Factors Page). **(T-2).** The number found on this checklist may not match the MAFPS "DGDP" number. **(T-2).** Crews may contact the Flight Manager for an updated Required Ramp Fuel Load (RRFL) following a tail swap.

11.1.1.4. Tankering fuel for convenience is prohibited. If FM planned tankered fuel is deemed operationally necessary, it will be included in the RRFL and included on the MAFPS ASR in the Identified Extra block. **(T-2).**

11.1.1.5. When filing an alternate located in Alaska or at latitudes greater than 59 degrees (north or south) use standard holding fuel calculations. **(T-2).**

11.1.1.6. Local supplements will not dictate IAF or Top of Descent fuel. **(T-2).**

11.2. Fuel Planning Procedures.

11.2.1. Prior to departure, the minimum planned landing fuel at the primary destination is the greater of:

11.2.1.1. 18,000 lbs or **(T-2).**

11.2.1.2. Required fuel reserve, fuel required to transit to alternate (if required), contingency fuel, and any authorized identified extra fuel. **(T-2).**

11.2.2. Fuel Calculations. PICs verify the RRFL in the MC by ensuring all required planning data is input into the MC. **(T-2).**

11.2.2.1. If the MC calculates a destination fuel less than 18,000 lbs, generates an INSUFFICIENT FUEL message, or in the PIC's judgment, the RRFL is insufficient to complete the mission, the PIC:

11.2.2.1.1. Ensures the MC is properly programmed including any applicable drag indexes/factors into the performance factors page. **(T-2).**

11.2.2.1.2. PIC's may contact the FM to identify and resolve discrepancies in fuel planning calculations. The PIC is the ultimate authority for final fuel load.

11.2.3. When Actual Fuel Load (AFL) exceeds the RRFL by more than 5,000 lbs, consider defueling the aircraft to the RRFL.

11.2.4. When there is a conflict between an on-time departure and defueling, the 618 AOC (TACC) Deputy Director of Operations (DDO) or MAJCOM C2 equivalent will determine which takes precedence (OG/CC for training sorties). **(T-2).**

11.2.5. Once airborne: Change each destination and RZ alternate holding fuel (LSK 4L) to 0+45 or 2+00 (if using holding in lieu of), and remove all ID extra except 2.2K (fuel totalizer bias) and authorized tankered fuel to reflect the aircrew's ability to use all, some or none of the contingency fuel. If the MC generates an INSUFFICIENT FUEL message, recheck flight plan/performance factors for accuracy. If the MC is accurate consider divert options and contact a FM.

11.3. Fuel Conservation. It is Air Force policy to conserve aviation fuel when it does not adversely affect training, flight safety, or operational readiness. Aircrew and mission planners manage aviation fuel as a limited commodity and precious resource. Fuel optimization will be considered throughout all phases of mission planning and execution. **(T-2).** Comply with the following whenever consistent with tech order guidance and safety:

11.3.1. Fuel Loads. Excessive ramp and recovery fuel adds to aircraft gross weight and increases fuel consumption. Do not ferry extra fuel beyond optimum requirements for safe mission accomplishment and training objectives.

11.3.2. Flight Planning. Aircrew and mission planners optimize flight plans and flight routing for fuel efficiency.

11.3.3. Takeoff. Consider a rolling takeoff and Derated Thrust (DRT) to save fuel and minimize engine wear. Use DRT for takeoffs unless dictated by performance, tactics, etc.

11.3.4. Climb/Descent. In-flight procedures such as climb/descent profiles and power settings should also be considered for efficient fuel usage.

11.3.5. Descent. The optimum descent is executed at idle power. Avoid early descents whenever possible.

11.3.6. Weather Deviations. Attempt to coordinate for off-course deviation early so gross maneuvering is not required.

11.3.6.1. MAFPS ASRs are optimized for fuel based upon wind, altitude, etc. Accepting a "direct to" ATC clearance is not necessarily fuel or time advantageous. Crews should analyze all factors prior to accepting a "direct to" clearance off the MAFPS route.

11.3.7. Holding. If holding is required, hold clean at the most fuel efficient altitude and request a large holding pattern. Hold at endurance or performance manual recommended holding speeds, conditions permitting.

11.4. Computer Flight Plan. Reference MAFPS folder on EFB for current examples and descriptions.

11.5. Tactical Fuel Planning.

11.5.1. Ensure low level time and ground operations are accounted for during tactical missions. **(T-2).**

11.6. AAR Fuel Planning.

11.6.1. Preflight Fuel Planning. Enter MC information IAW T.O. 1C-17A-1-2. Ensure that UNID EXTRA and STORED fuel for any RZ is greater than 0.0.

11.6.2. In-flight Fuel Planning. For single and multiple AAR, PICs are responsible for computing recovery fuel requirements, and required on-load requirements. **(T-2).** Reference AFTTP 3-3.C-17 for AAR techniques.

Chapter 12

AIR REFUELING

12.1. General. This chapter establishes air refueling procedures and policy applicable to C-17 aircraft and aircrews and is in addition to those prescribed by the flight manual and other applicable directives.

12.2. AAR Limitations.

12.2.1. Tanker Autopilot. Tanker pilots notify receiver pilots when any axis of the autopilot is not used. If a tanker pilot or receiver pilot is required to fly autopilot-off for training, the pilot flying the opposing aircraft will be qualified (N/A for FTU or Upgrade Training). **(T-2).** Verbal notification and acknowledgement will take place between the tanker and receiver prior to conducting autopilot-off refueling. **(T-2).**

12.2.2. AAR Without Tanker Disconnect Capability. Without tanker disconnect capability means the boom operator cannot trigger an immediate disconnect. AAR will not be conducted after a loss of tanker disconnect capability. **(T-3). Exceptions:** Fuel emergency or contingency missions, JCS alert, and support missions under normal conditions when refueling is essential for home base recovery, or for any real-world mission when authorized. Do not accomplish any training, boom limit demonstrations, or practice emergency separations. **(T-2).**

12.2.3. Manual Boom Latching (MBL) (also referred to as Emergency Boom Latching (EBL), Override Boom Latching (OBL) and amplifier override). This is an emergency procedure. Normal tanker disconnect capability and automatic disconnect limits are inoperative. Use of this procedure must be authorized in the mission directive. **(T-2).** C-17s are not authorized to conduct MBL training. **Note:** The boom operator and receiver pilot will coordinate all actions as required by applicable directives and checklists when making AAR contacts using emergency boom latching procedures. **(T-2).**

12.2.4. Reverse AAR procedures will be accomplished for operational necessity IAW T.O. 1-C-17A-1. **(T-2).**

12.2.5. Breakaways. Follow procedures in IAW T.O. 1-C-17A-1 and ATP-3.3.4.2. After the tanker terminates the procedure, coordinate clearance back to astern if additional contacts are required for mission accomplishment.

12.2.6. Practice Emergency Separations:

12.2.6.1. Follow “Breakaways” guidance in **paragraph 12.2.5**.

12.2.6.2. Prior to the actual accomplishment of a practice emergency separation, coordination between the tanker pilot, boom operator, and receiver pilot is mandatory. Coordination will include when the separation will occur and who will give the command of execution. **(T-2).** Pilots will verify the AAR system is not in override. **(T-2).** Tanker disconnect capability must be verified by a boom operator initiated disconnect prior to accomplishing the separation. **(T-3).** Tanker disconnect capability will not be verified on the same contact as the Practice Emergency Separation. **(T-3). Note:** Practice emergency separations will terminate no lower than 500’ below tanker altitude. **(T-2).**

12.2.7. Receiver AAR Training for Unqualified Receiver Pilots. (This includes first pilots, and aircraft commanders refueling from the right seat). In-flight training will be accomplished under direct IP supervision. **(T-3).** The following procedures apply:

12.2.7.1. The receiver pilot informs and receives acknowledgment from the tanker of crew qualifications and anticipated training. **(T-3).**

12.2.7.2. For receiver pilot initial qualification or requalification, the receiver instructor/examiner pilot will be in one of the pilot seats with immediate access to the controls through all phases of the refueling from the astern position until back to at least 100 feet in trail of the tanker. **(T-2).**

12.2.8. If a change of pilot control is made, the receiver aircraft will move back to at least the astern position except for immediate assumption of control by the instructor pilot. **(T-2).**

12.2.9. If a tanker or receiver seat change takes place, move back to at least 100 feet in trail of the tanker and to a point where the receiver pilot can maintain visual contact with the tanker until the seat change is complete. **(T-2).**

12.2.10. Tanker disconnect capability will be demonstrated by a boom operator initiated disconnect before conducting a limit demonstration. **(T-2).** Tanker disconnect capability will not be verified on the same contact as the limit demonstration. **(T-2).**

12.2.11. Weather Limitations.

12.2.11.1. Turbulence. Do not plan AAR if severe turbulence is forecast on the refueling track. **(T-2).** Terminate refueling if moderate turbulence is encountered. **(T-2).**

12.2.11.2. Visibility. Do not close from 1 NM range (2 NM for receiver or tanker formations) unless you have visual contact with the tankers. **(T-2).** Discontinue refueling if in- flight visibility is insufficient to continue safe refueling operations. **(T-2).**

12.2.11.3. AAR alternate airfields must meet the criteria of AFI 11-202V3, *General Flight Rules*. **(T-2).**

12.2.12. NVG Use During AAR. Pilots may use NVGs during air refueling rendezvous to acquire the tanker but must remove goggles NLT 1 NM from the tanker. **(T-3).**

12.3. Receiver Aircraft Commander Responsibilities.

12.3.1. Always obtain a stable, astern position (no closure or drifting back) prior to closing to the contact position. **(T-3).** The astern position is approximately 50 feet aft and slightly below the tanker boom nozzle.

12.3.2. Will ensure planned air refueling altitude is within aircraft formatting capability. **(T-2).**

12.3.3. PICs must receive permission from controlling authority (i.e., OG/CC, 618 AOC (TACC)) prior to accomplishing opportune AAR. **(T-3).**

12.3.4. Crews shall not redistribute fuel to increase AAR onload rate. **(T-2).**

Chapter 13

COMBAT MISSION PLANNING

13.1. General. This chapter provides general combat mission planning guidance for planners and aircrews, standardizing procedures for planning, briefing, and reviewing all missions. Planners and aircrews should reference AFTTP 3-3.C-17 for additional mission planning techniques.

13.1.1. Pilots will be given one full day of planning for any missions employing low-level operations. **(T-3). Exception:** Formal Training Unit (FTU) OG/CC may approve missions with low-level operations on locally developed routes using backup pilots without a full day of mission planning when circumstances would prevent sortie execution. Aircrews operating under this exception will add 30 minutes to their sequence of events to accommodate a thorough low-level study on the day of flight. **(T-3).**

13.2. Assault Landing Zones (ALZ). Landing zone size, lighting patterns, and composition criteria are contained in AFI 13-217.

13.2.1. AFTTP 3-3.C-17 provides techniques to planning approaches.

13.3. Drop Zone (DZ) and ALZ Surveys. The Zone Availability Report (ZAR) is the source for all DZ and ALZ surveys.

13.4. Route Planning. To the maximum extent possible, crews should reference techniques in AFTTP 3-3.C-17. Low-level flight will be planned using tactical corridors. **(T-3).** The standard width for a tactical corridor is 3 NM. Tactical corridor width can vary from 1 NM minimum either side of centerline, to as wide as desired. Corridors do not have to be symmetrical, but must be annotated on the chart. **(T-3).** The following altitudes are the minimum established for C-17 operations. FLIP/ICAO procedures, training considerations, terrain, or operational directives may dictate higher altitudes.

13.4.1. Day VMC is 300 feet AGL, modified contour. **(T-1).**

13.4.1.1. Fly modified contour by using radar altimeter, HUD, and visual references. **(T-2).**

13.4.2. Night En Route Altitude is an indicated altitude of 500 feet above the highest obstruction to flight, within a tactical corridor. **Note:** If DTED is not available, Night En Route Altitude will be calculated using 400 feet plus one chart contour interval above the highest depicted terrain contour, if higher. **(T-1).**

13.4.3. NVG En Route Altitude. Fly no lower than an indicated altitude of 500 feet above the highest spot terrain (charted or DTED spot elevation) within a tactical corridor. **(T-2). Note:** If DTED is not available, NVG En Route Altitude will be calculated using 400 feet plus one chart contour interval above the highest depicted terrain contour, if higher. **(T-1).**

13.4.3.1. NLT 3 NM prior to any charted man-made obstacle within the NVG tactical corridor, the aircrew must visually identify the obstacle. (T-2). If the obstacle is not identified by 3 NM or lateral deconfliction cannot be ensured with navigational aids (i.e. mission computer Ground Reference Points, chart study, etc.) climb to 500 feet above the obstacle until the aircrew confirms the aircraft is past the obstacle, or until the crew can identify the obstacle and maintain well clear, laterally and/or longitudinally. **(T-2).**

13.4.4. Minimum Safe Altitude (MSA). MSA is an initial VFR altitude that provides additional terrain and obstacle clearance while the aircrew analyzes situations that require interruption of low-level operations (route disorientation and equipment malfunctions or when either pilot leaves the seat during low-level operations, etc.). Plan MSA at an indicated altitude of 500 feet above the highest obstruction to flight, within 5 NM of route centerline. **Note:** If DTED is not available, MSA will be calculated using 400 feet plus one chart contour interval above the highest depicted terrain contour, if higher. An MSA will be computed for each leg, route segment, or entire low-level route. **(T-2).**

13.4.5. IMC En Route Altitude. Fly no lower than 1,000 feet (2,000 feet in mountainous terrain) above the highest obstruction to flight within 5 NM of route centerline (10 NM outside the US unless 5 NM authorized by MAJCOM/A3). **(T-2).** Round this altitude to the next 100-foot increment. **(T-2).**

13.4.5.1. Minimum altitudes for IFR operations within published Military Training Routes (MTRs)/Special Use Airspace (SUAS) in US sovereign airspace or operational minimum risk routing (MRR) will be the computed leg MSAs unless a higher altitude is required by FLIP AP/1B or SPINS. **(T-2).**

13.4.5.1.1. ANP 1.0 or less is required to fly lower than MSA at night. **(T-2).** ANP 0.3 is required to fly tactical corridors less than 3 NM left and right of centerline at night. **(T-2).** In the event of suspected GPS degradation, crews may continue in a tactical corridor smaller than 3 NM either side of centerline so long as centerline can be identified via formation position and/or ground reference.

13.4.5.1.2. Obstruction to flight is defined as man-made obstacle, terrain feature, charted spot elevation, or DTED spot elevation.

13.4.5.1.3. DTED information may be used but is not required in determining low level altitudes.

13.4.5.1.4. Fly with reference to the pressure altimeter, using the radar altimeter as a backup. **(T-2).**

13.4.5.1.5. If the altitude for the next leg is higher than the current leg altitude, complete climbs before the turn point. **(T-2).** If the altitude for the next leg is lower, do not initiate descent until after the turn point. **(T-2).**

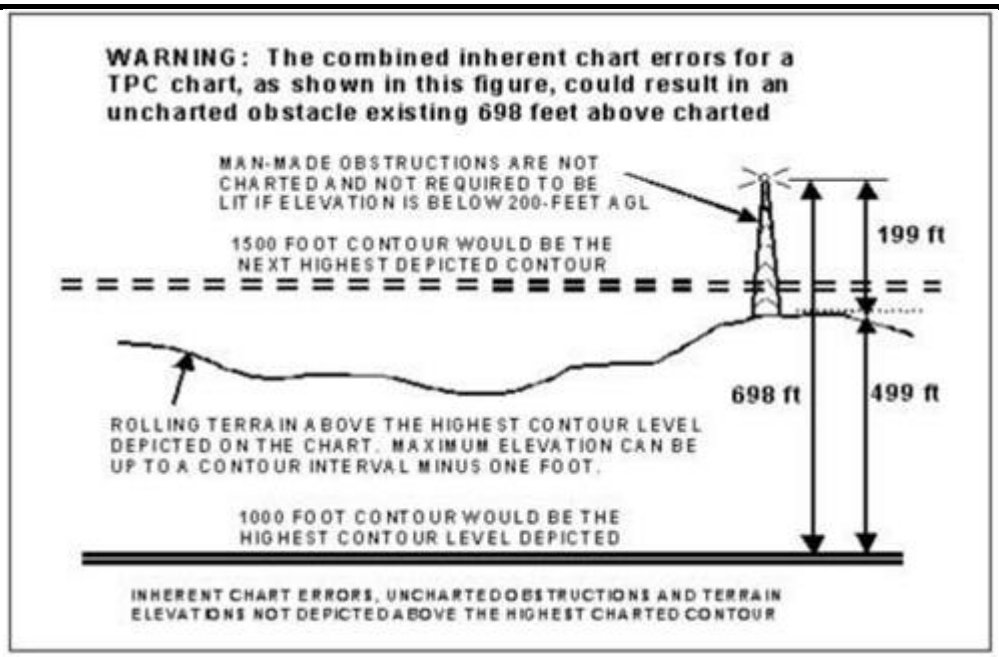
13.4.5.1.6. Legs may be segmented to allow flight closer to the ground. Once the obstruction is visually identified and the aircraft can maintain well clear, laterally and/or longitudinally, the crew may descend to the next segmented altitude, if lower.

13.4.6. Emergency Safe Altitude (ESA). ESA is 1,000-feet (2,000-feet in mountainous terrain) above the highest obstruction to flight within 22-NMs of planned route centerline.

13.4.6.1. Several ESAs may be computed for route segments transiting significant terrain differentials or a single ESA may be computed for the entire low level route.

13.4.6.2. Climbing to ESA may put the aircraft or formation in a controlled (i.e., IFR) altitude structure and require coordination with Air Traffic Control agencies. **Note:** Mountainous terrain as defined in AFI 11-202V3.

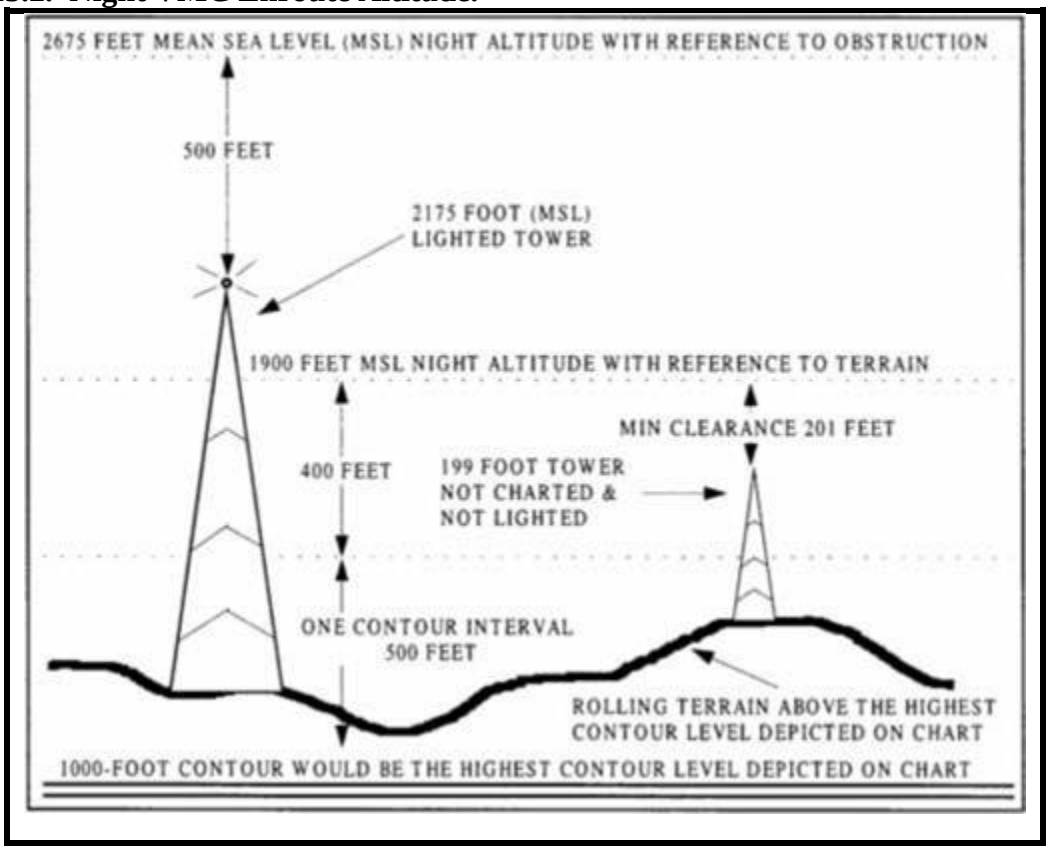
Figure 13.1. Inherent Chart Errors.



Warning: Aeronautical charts do not depict man-made obstacles less than 200-feet AGL or a change in terrain until it exceeds the chart contour interval. The worst situation would occur if a 199-foot tower sat on terrain with an elevation just below the next higher contour. For a TPC (1:500,000) with a contour interval of 500-feet, this results in an uncharted obstacle existing 698 feet above charted terrain. Additionally, the highest spot elevation on any given leg may not be the highest terrain as in the case of gradually rising elevations. Planners will ensure accurate terrain analysis by evaluating both spot elevations and the highest contour level. **(T-2).**

Caution: Some charts may depict terrain and obstacle altitudes in meters versus feet (e.g. JOG and TLM charts in some areas of the world).

Figure 13.2. Night VMC Enroute Altitude.



13.4.7. Temperature Correction. For all low level operations, temperature corrections will be applied to the minimum IFR, VMC night and NVG altitudes. **(T-2).** Apply corrections IAW the temperature correction chart provided in the FIH to ensure adequate obstacle clearance. **(T-2).** Add the values derived from the FIH temperature correction chart to the IMC and Night minimum enroute altitudes whenever the outside air temperature is 32°F/0°C or below. **(T-2).**

13.5. Peacetime Route Restrictions. In addition to restrictions in AFI 11-202V3, specific country or theater of operations publications, and FLIP area planning, routes should not be planned or flown:

13.5.1. With less than 1 NM separation (3 NMs when in excess of 250 KCAS) when below 2000 feet AGL from known sensitive environmental (i.e., hospitals, fish hatcheries, large poultry complexes, recreation areas, institutions, etc).

13.5.2. With less than 3-NMs separation from prohibited airspace.

13.5.3. With less than 3-NMs separation from nuclear power plants.

13.5.4. Through restricted airspace without clearance.

13.5.5. Below 1,000-feet AGL within a 2,000-feet radius over cities or towns shown as magenta shaded areas on 1:500,000 (TPC) scale charts in addition to the restrictions in AFI 11-202V3, **Chapter 6**.

13.5.6. Over or through active live fire or impact areas that may not be specifically designated as prohibited or restricted areas.

13.5.7. Below 500-feet AGL unless:

13.5.7.1. Host nation rules specifically allow such VFR operations.

13.5.7.2. Routes or training areas have been environmentally assessed and surveyed for 300-feet AGL operations. This restriction does not apply to one-time-use routes. Consult FLIP AP/1B for published Military Training Route restrictions.

13.6. Navigation Chart Preparation. Low-level navigation charts will be updated and annotated with the most recent Vector Vertical Obstruction Data (VVOD) or supplement. **(T-2).** In no case will VVOD coverage be less than 22 NMs either side of the entire planned route centerline. **(T-2).** Crews may trim charts to no less than 10 NMs of the planned route centerline after establishing the ESA. **Caution:** 1:50,000 and smaller scale maps do not depict aeronautical information, may not show man-made obstacles, and are rarely updated through the VVOD.

13.6.1. Chart Annotation. Individual chart annotations will have, as a minimum, turn points, IP, objective area, course line, navigation information, VVOD data and date, ESA and chart series/date. **(T-2).** Reference AFTTP 3-3.C-17 for standard chart techniques.

13.7. Route Study. Crew route study is mandatory before accomplishing flight in the low level environment. The route study will include, at a minimum: **(T-2).**

13.7.1. Route overview.

13.7.2. Obstacles/obstructions along the planned route.

13.7.3. Leg information (e.g. course, altitudes, and controlling obstacles).

13.7.4. Low level hazards and mitigation.

13.7.5. Terrain features.

13.7.6. Individual crew member responsibilities/duties.

13.7.7. Discussion of any airspace restrictions.

13.7.8. ESA controlling obstacle and location.

13.8. Airlift Support Forces Coordination. Ensure coordination is complete with airlift and supporting forces. **(T-2).**

13.9. Briefings. The PIC will ensure all applicable briefings and de-briefings are completed for each mission. **(T-2).** Brief applicable items in sufficient detail to ensure a clear understanding of mission objectives and procedures. The PIC is responsible for ensuring all crewmembers are briefed on applicable mission items. **(T-2).**

Chapter 14

MISSION EMPLOYMENT/TACTICAL PROCEDURES

14.1. General.

14.1.1. Refer to AFTTP 3-1.C-17 and AFTTP 3-3.C-17 for mission employment and tactical procedures.

14.2. Tactical Checklists. Initiate the Combat Entry Checklist so it is completed prior to entering the combat area. Execute the Combat Exit Checklist after vacating the combat area. These checklists will be executed for all airdrop and tactical airland missions. **(T-2).**

14.2.1. As a minimum, the PF, PM and primary LM will remain on interphone from initiation of the Combat Entry Checklist until completion of the Combat Exit Checklist, unless crew duties require otherwise. **(T-2).**

14.2.2. Personnel performing duties requiring them to be mobile in the cargo compartment during airdrop, low level operations, or threat environments will wear protective headgear. **(T-2).** All other personnel in the cargo compartment will be seated with seat belts fastened. **(T-2).**

14.2.3. During accomplishment of tactical checklists, do not change IFF or CALLSIGN X until appropriate FIR boundaries have been transited or as directed by ATC. **(T-2).**

14.3. Tactical Descents, Arrivals and Departures.

14.3.1. Formation tactical descents are limited to VMC, 3-ship formations and a minimum of 6,000 ft spacing between aircraft. **(T-2).**

14.3.2. Unless operational necessity dictates, limit tactical descents to comply with all required airspace speed restrictions except as directed by T.O. 1C-17A-1, (i.e. 250 KIAS below 10,000'.) **(T-2).**

14.4. Ground Operations.

14.4.1. NVG Taxi/Backing. Pilots may taxi using NVGs on airfields without lights (blacked out) or equipped with overt or covert lights. If taxiing or accomplishing ground ops on blacked out taxiways/runways/ramps, the Aircraft Commander will ensure aircraft or environmental lighting provides for clear definition of taxiway/runway/ramp edge. **(T-2).** Comply with all taxi restrictions in **Chapter 4** and the ASRR. The LM may provide the pilot with directions to taxi the aircraft while using NVGs.

14.4.2. Engine Running Onload and Offload (ERO) Procedures. Do not use Troop doors. **(T-2).** Do not on-load or offload through the crew entrance door and cargo ramp/door at the same time unless both doors are directly supervised by a C-17A qualified pilot/loadmaster. **(T-2).** If a combat offload is to be accomplished before offloading vehicles, do not remove restraint until after the combat offload is completed. **(T-2).** When EROs are accomplished through the cargo ramp and door, place engines in reverse idle prior to the pilot giving clearance for off/on-load operations. **(T-2).** If a thrust reverser doesn't extend, consideration should be given to shutting down the affected engine. With exception of small arms ammunition (hazardous class/division 1.4) do not ERO explosive cargo unless authorized in the JA/ATT, exercise, operation or contingency air tasking order, SPINS, etc. **(T-2).**

14.4.2.1. Do not release vehicle parking brakes until all restraints are removed and cleared by the loadmaster. **(T-2).**

14.4.2.2. Personnel to be offloaded will be briefed to secure their baggage aboard vehicles (if applicable). **(T-2).**

14.4.2.3. Vehicles and all personnel exiting via the ramp will proceed directly aft of the aircraft at least 25 feet before turning and/or at least 200 feet before stopping. **(T-2).**

14.4.2.4. The loadmaster directs all onload and offload operations using briefed signals. Other qualified personnel (Contingency Response Group (CRG) loadmaster, aerial port member, etc.) may perform these duties; however, the primary loadmaster retains overall responsibility for the operation. Passengers should be escorted (CRG, Aerial Port, airfield control personnel, etc) when enplaning or deplaning. Deplane passengers before removing cargo and enplane after loading cargo unless cargo size and location dictates otherwise. **(T-2).**

14.4.2.5. Load Data. The loadmaster may use the load plan total weight and load center of balance (CB) for entry on the DD Form 365-4 provided these procedures are followed:

14.4.2.5.1. The load plan data will be checked by a qualified load plan validator (i.e. aircraft loadmaster, CRG loadmaster, aerial port specialist, or any individual who has completed the AMC Affiliation Program Airlift Planners Course). **(T-2).**

14.4.2.5.2. If downloading to an empty aircraft, a DD Form 365-4 is not required for the subsequent sortie.

14.4.2.6. Crew Entrance Door ERO Procedures. The PIC may approve the offload or onload of personnel and small cargo through the crew entrance door. In this instance, the throttles may be positioned to idle or reverse idle. Deplane the loadmaster to assure safety of deplaning/enplaning of personnel. **(T-2).**

14.4.2.7. Reduced Lighting EROs. Reduced light EROs must be accomplished with red/NVIS (overt) lighting in the cargo compartment sufficient to permit MHE drivers to see marshaller's signals and safely position MHE. **(T-2).** Dimming rheostat will be set to minimum amount of lighting to accomplish LMs duties. **(T-2).** Marshallers will not use NVGs to position MHE within 25 feet of the aircraft for on/offloading operations. **(T-2).** MHE operators may utilize NVGs to the final parking position for situational awareness. LMs may use NVGs to maintain situational awareness behind the aircraft before and after actual loading.

14.4.3. Combat Offload Procedures. On operational missions, the controlling MAJCOM/A3 or Director of Mobility Forces (DIRMOBFOR) may authorize combat offloads when conditions warrant. OG/CC may approve combat offloads on training missions following a thorough risk assessment.

14.4.3.1. Many explosive items have specific "drop criteria" that, if exceeded, render the item useless or dangerous to the user. Small arms ammunition (Division 1.4) and all other Class 1 cargo rigged for airdrop (i.e.; with cushioning material), may be combat offloaded. All other Class 1 cargo shall not be combat offloaded, unless specifically directed by the approving authority. **(T-2).**

14.4.3.2. Excessively rough, sharply undulating or battle damaged surfaces may cause damage to the aircraft during combat offload operations. Reducing forward taxi speed on these surfaces reduces aircraft oscillation. The PIC is responsible for ensuring the offload area permits the offload operation to be conducted without damage to the aircraft. The PIC is ultimately responsible for ensuring the area in front and behind the aircraft is clear during the operation. The loadmaster ensures the area behind the aircraft is well clear of anything which may be damaged due to engine exhaust blast. To combat offload, a surface of at least 1,000 feet is required; however, 1,500 feet is desired to provide a margin of safety. **(T-2).**

14.4.3.3. Ensure the crew rest window to the cargo compartment is clear of obstructions for combat offload operations. **(T-2).**

14.4.3.4. If ground personnel are present, the loadmaster contacts the individuals to ensure no one disrupts the operation. **(T-2).** After the area is clear and secure the loadmaster positions for the offload. **(T-2).**

14.4.3.5. All combat offloads will be accomplished from the forward loadmaster station. **(T-2).**

14.4.3.6. If combat offloading to an empty aircraft, a DD Form 365-4 is not required for the subsequent sortie.

14.4.3.7. NVG Combat Offloads. Pilots may accomplish Combat Offloads on NVGs at airfield light levels down to and including blacked out, provided aircraft or airfield lighting permit clear definition of taxiway/runway/ramp edges. Loadmasters may accomplish Combat Offloads on NVGs with Red/NVIS (overt) or IR (covert) cargo compartment lighting set at minimum levels to perform loadmaster duties safely. Blacked out (no-light) operations in the cargo compartment are not authorized. **(T-2).**

14.5. Emergency Airlift of Personnel. Use these procedures for noncombatant evacuation and combat loading of personnel when directed by the controlling combatant commander, MAJCOM/A3 or DIRMOBFOR. Airlift of this nature is normally accomplished without the use of individual seats, seat belts, or litter stanchions. Emergency Oxygen sources are not available. For planning purposes, an estimate of 300 personnel can be seated on the main floor, and 50 on the ramp. The number of personnel vary depending on their size, amount of baggage/equipment carried, and the number of tiedown straps onboard the aircraft.

14.5.1. The following methods maximize the number of personnel that can be carried:

14.5.1.1. Seat passengers in sidewall seats first and then facing forward on the cargo floor or ramp in lateral rows. Consider reserving the use of sidewall seats for passengers with special needs (elderly, pregnant, wheelchair bound, small children, etc.)

14.5.1.2. Attach the hook end of cargo straps to tiedown rings in rows A and G. After personnel are seated, route straps laterally across their legs and secure ratchet end of straps to the tiedown ring in row D. Use caution; overtightening the strap restricts blood circulation in the legs of passengers.

14.5.1.3. Combat Troops may sit on rucksacks secured with tie-down straps or individual restraint device (last-resort belt) clipped into tie-down rings. If rucks are worn on backs and equipped with a quick-release strap, brief troops to leave their rucks on the aircraft in the event of an emergency.

14.5.1.4. If possible, secure baggage separately; palletized or stacked/secured on the ramp.

14.5.2. The maximum altitude for emergency airlift will not exceed FL250. **(T-2).**

14.5.3. Consider adding additional emergency equipment, fleet service supplies and cargo straps.

14.5.4. For floor loading of litter patients, refer to Addendum A of AFI 11-2AEV3, *Aeromedical Evacuation Operations Configuration/Mission Planning.*

Chapter 15

AIRCRAFT FORMATION

15.1. General. Formation procedures will be conducted IAW this chapter and T.O. 1C-17A-1. **(T-2).** Aircrews will follow formation standards described in AFTTP 3-3. C17 unless otherwise briefed. **(T-2).** Consider safety, aircrew capability, proficiency, survivability and user requirements when planning any formation.

15.1.1. Vortices generated during departure, airdrop, and recovery can be significant in size, duration, and velocity. Due to the potential hazards, aircrews should be aware of their existence and attempt to avoid them.

15.1.2. Aircraft may alter position slightly to avoid vortices from preceding aircraft.

15.1.3. References to "SKE" in this publication apply to all forms of Station Keeping Equipment and Formation Flying System (SKE/FFS).

15.2. Specified Times. The mission commander determines the sequence of events and mission times based on ATO, FRAG, planning, staff input, fuel requirements, passenger/jumper comfort, taxi distances, briefing requirements, etc.

15.3. Weather Minimums.

15.3.1. Takeoff. Takeoff minimums are no lower than 200 foot ceiling and one-half mile visibility (RVR 2400). **(T-2).** If the departure ceiling or visibility is below published approach minimums, the formation may takeoff if the requirements for a departure alternate (IAW AFI 11-202V3_AMCSUP) are met. **(T-1).**

15.3.2. Landing. Landing minimums are the published minimums for the airport navigation aid used, but no lower than 200 foot ceiling and one half-mile visibility. **Note:** Formation NVG landing minimums are in accordance with **Chapter 5**, NVG Approach and Landing.

15.4. Ground Operations. The minimum taxi interval is one aircraft length. **(T-2).** Lead may increase the taxi interval if circumstances dictate.

15.5. Takeoff. For takeoff, aircraft feed onto the runway individually. The takeoff EPR rating (i.e., DRT or MAX) will be briefed and all aircraft will takeoff with the same EPR rating. **(T-2).**

15.5.1. The minimum takeoff interval is 30 seconds. **(T-2).** It is possible at high power settings to cause a FOD hazard to following aircraft, so plan departure spacing accordingly. Begin timing for takeoff interval when the preceding aircraft starts its takeoff roll.

15.5.2. For aborts during takeoff, a briefed crew member (normally a loadmaster) immediately transmits position number aborting three times on interplane frequency (i.e., "BASCO 70, number two aborting, number two aborting, number two aborting."). The PM transmits the same abort call on runway controlling frequency (after completing emergency procedures requiring immediate action). The aborting aircraft clears the runway as safety allows. Succeeding aircraft, if not on takeoff roll, hold until the runway is clear and a new takeoff clearance is obtained. Any aircraft on takeoff roll will abort their takeoff. **(T-1).**

15.6. Bank Angles, Airspeeds, and Rates of Ascent/Descent. Standard airspeeds and rates of ascent/descent are depicted in AFTTP 3-3. C-17. These standards will be followed unless

otherwise briefed. **(T-2).** Lead should select MIN/20 degrees of bank when using SKE. Element leads should select NORM/20 for turn rate and bank angle on the AFCS panel when flying SKE.

15.7. Radio Discipline. Limit transmissions to those required for safety or control of the formation. **Note:** HAVE QUICK and secure communications should be used when available.

15.8. Airborne Aborts (Departure, Enroute and Element Lead Abort). Any aircraft that cannot maintain formation position will notify lead of the nature of the emergency and intentions. **(T-2).** If the emergency does not permit maintaining position until an individual clearance is obtained, establish a safe heading away from the formation and maintain visual or SKE contact. If unable to maintain visual or use SKE, the use of A/A TACAN, TCAS, or radar skin paint may aid in maintaining separation from the formation. After departing the formation, the aborting aircraft will climb or descend out of the formation altitude prior to maneuvering across the flight path of the formation. **(T-2).**

15.8.1. Departure. Aircraft aborting during assembly will execute the briefed emergency procedures, hold clear of departing traffic, maintain VMC if possible, notify lead, and contact the appropriate controlling agency. **(T-2).** If possible, the aborting aircraft remains clear of the formation until a landing can be made without interfering with the remainder of the departing formation.

15.8.2. Enroute**.** Aircraft that abort after assembly turn away from the formation and, with mission commander's concurrence, may proceed to a suitable recovery airfield or rejoin at the end of the formation.

15.8.3. Element Lead. If an element lead aborts the formation, the second aircraft of that element moves to the element lead position. **(T-2).** If a formation is flying a three-ship element, aircraft within the element may move up to maintain a two-ship element.

15.8.3.1. For SKE formations, the appropriate follower aircraft select the new lead, positively identify the new leader on the SKE MFD, reset cross-track and range as required. **(T-2).**

15.9. Visual Procedures. Visual formation geometry is driven by the tactical situation, which is determined by the threat environment, terrain, mission requirements and other factors. For a complete description of visual geometries reference AFTTP 3-3. C-17. Choose the geometry that gives the best tactical advantage. Different formation geometries may be required through the course of the mission. Flight leadership is critical to the success of these tactics.

15.9.1. Departure and Assembly. After crossing the field boundary, wingmen adhere to air traffic control requirements and close to enroute position. Lead maintains assembly airspeed, until briefed acceleration time/point.

15.9.2. Acceleration. Commence timing for acceleration when lead starts takeoff roll. At acceleration time/point, lead accelerates to attain climb/enroute airspeed.

15.9.3. Late Take Off. Aircraft joining a formation enroute contact lead and rejoin as briefed/directed. The rejoining aircraft will remain at least 500 feet above or below the formation until the formation is in sight and cleared to rejoin. **(T-2).**

15.9.4. Enroute Procedures:

15.9.4.1. Spacing. Plan a minimum of 2,000 feet spacing within each element and 12,000 feet between elements. **(T-2).**

15.9.4.2. Minimum Altitude.

15.9.4.2.1. Day VMC. Formation lead flies modified contour by using radar altimeter, HUD, and visual references. **(T-2).** Element leads/wingmen use a combination of the above and reference to other aircraft. **(T-2).**

15.9.4.2.2. Night VMC. Formation lead maintains altitude by reference to the barometric altimeter. **(T-2).** Element leads/wingmen use a combination of barometric altimeter and reference to other aircraft. **(T-2).**

15.9.4.3. Airspeed. Leads announce unplanned airspeed changes greater than 10 knots. **(T-2).**

15.9.4.4. Inadvertent Weather Penetration (IWP). Formation leads make necessary actions to not take a VFR formation into the IMC conditions. **(T-2).** If clouds and/or areas of poor visibility are inadvertently entered by a formation operating under VFR, the primary concern of the formation lead is to provide safe aircraft separation and terrain clearance. Wingmen immediately notify lead of deteriorating visual conditions if they occur. **(T-2).** Terminate these procedures if the entire formation attains VMC, terrain clearance, and positive separation from other formation aircraft. **(T-2).**

15.9.4.4.1. It may be necessary to modify these procedures due to formation geometries other than visual in-trail, terrain, airspace restrictions, etc. Inadvertent weather penetration in mountainous terrain using these procedures may be hazardous. Mission planners should brief procedures that best suit the situation.

15.9.4.4.2. The following procedures are for emergency use and do not constitute authority to violate AFI 11-202V3 or Federal Aviation Regulations (FAR). Formation lead take all practical measures to avoid entering controlled airspace without clearance. **(T-2).** Attempt to avoid leveling at IFR altitudes to minimize the possible conflict with IFR traffic.

15.9.4.4.3. Inadvertent weather penetration with SKE. Immediately upon penetrating the weather, formation lead announces, "XXXX flight, execute inadvertent weather penetration with SKE now, base altitude XXXX, base heading XXXX, base airspeed XXXX. Acknowledge." **(T-2).** The formation then climbs to a base altitude at or above the ESA for the route. **(T-2).** Climb at cruise speed and 1,000 feet per minute. **(T-2).** After the element wingmen establish a 1,000 feet per minute climb, set AFCS mode select to SKE, set cross-track to 1,000 feet left or right as appropriate while maintaining current separation. **(T-2).** When level at the base altitude, lead announces "assume SKE interval now." **(T-2).** At this command, followers select appropriate SKE in-trail interval in the LTRK and drift back to establish appropriate SKE in-trail intervals. **(T-2).** If visual conditions cannot be promptly reestablished, lead contacts ATC for IFR clearance; declare an emergency if necessary. **(T-2).** **Note:** This procedure is only used if SKE was tested, all formation aircraft have SKE in Transmit (XMIT), SKE is operable, and no SKE cautions and warnings.

15.9.4.4.4. Inadvertent weather penetration without SKE. Immediately upon penetrating the weather, formation lead announces, "XXXX flight, execute inadvertent weather penetration without SKE now, base altitude XXXX, base heading XXXX, base airspeed XXXX. Acknowledge." **(T-2).** The formation climbs to a base altitude at or above the ESA for the route. **(T-2).** Climb at cruise speed and 1,000 feet per minute. **(T-2).** After the element wingmen establish a 1,000 feet per minute climb, #2 turns right using 30 degrees of bank to a heading 30 degrees from the base heading, #3 turns left using 30 degrees of bank to a heading 30 degrees from the base heading. **(T-2).** They maintain these divergent headings (once rolled out) for 30 seconds before resuming base heading. **(T-2).** The use of air-to-air TACAN, TCAS, or radar skin paint may aid in maintaining separation from other members of the formation. The last element in the formation occupies the base altitude. **(T-2).** All other elements stack 1000 feet higher than the following element, with the first element occupying the highest altitude. **(T-2).** Do not change base heading while in IMC unless required for terrain clearance or to avoid controlled airspace. **(T-2).** If visual conditions cannot be promptly reestablished, lead contacts ATC for IFR clearance; declare an emergency if necessary. **(T-2).**

15.9.5. Recovery. If aircraft weights differ significantly, the heaviest aircraft dictates the speeds flown. Aircraft will not descend below preceding aircraft during the recovery. **(T-2).**

15.9.6. Formation Landings. All aircraft land on runway centerline with the same flap detent setting **(T-3). Exception:** Last aircraft in formation may use a higher flap setting. Continue to runway exit point without stopping in any position that would prevent succeeding aircraft from clearing the runway. **(T-2).** The minimum landing interval is 45 seconds (60 seconds desired). **(T-2).** Extend the interval as necessary for icy runway conditions, short/narrow runways, or other adverse conditions. **(T-2).**

15.9.6.1. Aircraft will not perform touch and go landings out of formation recoveries. **(T-3).**

15.9.6.2. Aircraft may perform GOATs for training provided it is pre-briefed, does not negatively affect the formation recovery, and all preceding formation aircraft are clear of the runway.

15.9.7. Lead Changes. To accomplish a visual lead change, the leader signals or commands the lead change (if it does not occur at a briefed point). **(T-3).** The aborting leader maneuvers in the safest direction to assume the new position.

15.9.8. SKE. Use during visual formation. Except for SKE out during visual training, SKE should be available to the max extent possible while flying visual procedures.

15.9.8.1. During visual procedures, aircrew will set "PROX WARN" to 1000 (1500 if in personnel spacing). **(T-2).**

15.9.8.2. Aircraft should select "wingman" and "AR MODE: Yes" on the SKE SETUP page.

15.10. SKE Procedures. Note: When in actual IMC, aircrews should be prepared to use an alternate method of identifying other aircraft in the formation (i.e., A/A TACAN, TCAS, and radar skin paint) in case of a SKE malfunction.

15.10.1. During SKE procedures, aircrew will set "PROX WARN" to 2000 (1500 if in personnel spacing) and AR MODE to "yes". **(T-2).**

15.10.2. Flight Command Indicator (FCI). Element leaders should transmit FCIs prior to turns. If FCIs are not received prior to turns, wingman SKE XTRK/LTRX positioning is not affected, FCIs are fundamentally used for situational awareness. Do not delay turns in order to send FCIs. FCIs may be sent after a lead has initiated a turn for additional situational awareness.

15.10.3. Departure and Assembly. After takeoff each aircraft flies an independent departure, (i.e. climb out instructions or SID), while maintaining formation integrity using the PPI until all aircraft attain formation position or the departure is accomplished, whichever occurs first.

15.10.4. Enroute Procedures. Wingmen maintain position with SKE selected for thrust and roll flight director guidance. Wingmen periodically crosscheck deviation indicators and the PPI SKE format. The primary altitude reference is the aircraft barometric altimeter.

15.10.4.1. Climb and Descent. Use the vertical deviation indicator (VDI) to monitor the selected leader's altitude during climb or descent. **(T-3).** Followers report significant altitude deviations to lead. **(T-3).**

15.10.4.2. Airspeed Changes. Lead signals or announces all changes of 10 knots or greater from the established base airspeed. **(T-3).**

15.10.4.3. Domestic Reduced Vertical Separation Minimum (DRVSM). RVSM separation standards may be applied to formation flights consisting of all RVSM-compliant aircraft operating in DRVSM airspace. **Note**: DRVSM airspace includes the airspace of the lower 48 states of the United States, Alaska, Atlantic and Gulf of Mexico high offshore airspace, and the San Juan FIR between flight level (FL) 290-410 (inclusive).

15.10.4.3.1. RVSM formation flights may file for a single altitude if all formation aircraft fly the assigned altitude, either offset laterally from each other or in trail.

15.10.4.3.2. RVSM formation flights requiring multiple altitudes should request an altitude block. Air traffic control may then apply RVSM separation standards between this altitude block and other RVSM aircraft (e.g. an RVSM formation flight is assigned flight level (FL) 320-330; ATC assigns other RVSM aircraft at FL310 and FL340).

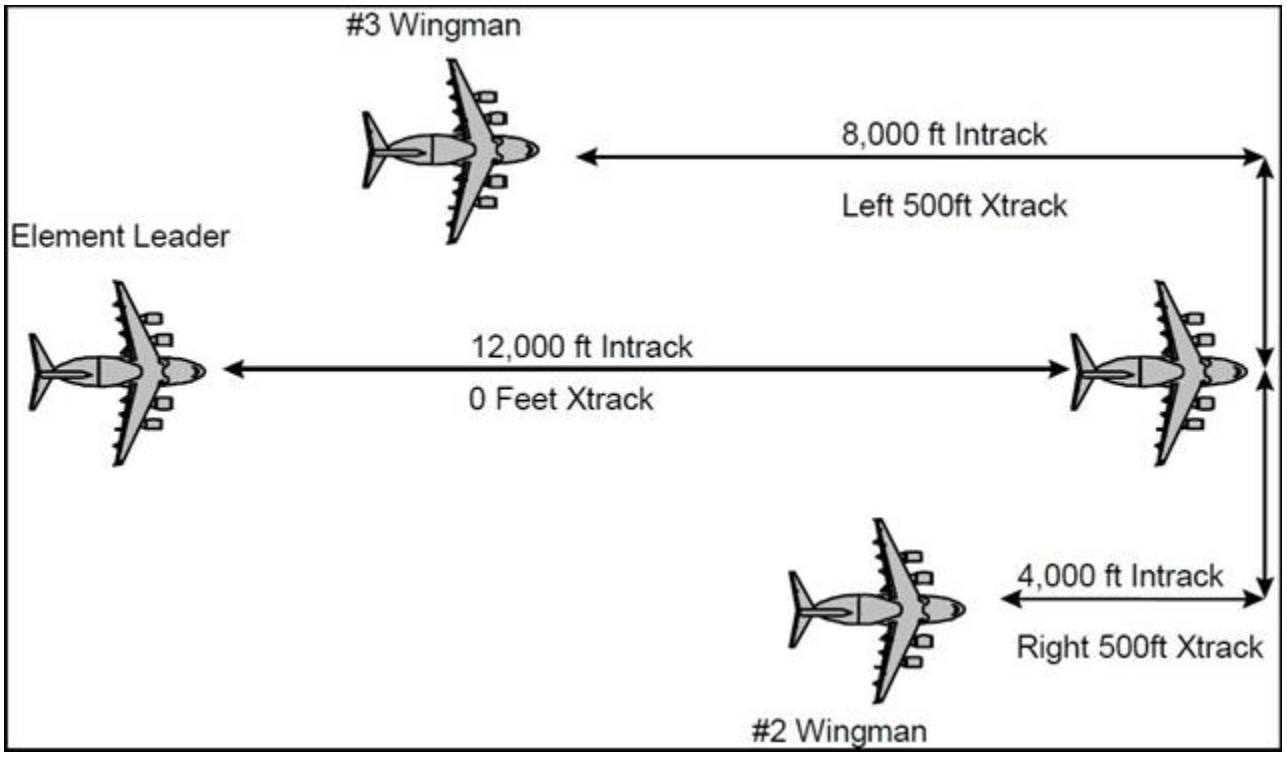
15.10.4.3.3. RVSM formation aircraft must use their automatic altitude control system to maintain the assigned altitude. **(T-2).** Aircraft maneuvering within an altitude block must ensure they do not exceed the vertical boundaries of the block by utilizing the aircraft altitude alerting system, altitude capture function (if installed) and automatic altitude control system. **(T-2).** If unable to maintain autopilot in vertical axis notify ATC of non-compliance with RVSM. **(T-2).**

15.10.4.3.4. Formation flights which do not consist of all RVSM aircraft will continue to be considered non-RVSM compliant and will have 2,000 ft vertical separation standards applied in DRVSM airspace. **(T-2).** In addition, aircraft formations conducting aerial refueling will continue to be considered non-RVSM compliant; regardless of the participating aircraft's single-ship status. **(T-2).**

15.10.5. Enroute Spacing.

15.10.5.1. Wingman. The second and third aircraft of each element maintain a minimum of 4,000 and 8,000 feet spacing, respectively, from their element lead. **(T-2).** Maintain spacing with reference to the element lead to reduce telescoping effects. **(T-2).** The minimum offset distance is 500 feet right for the number 2 aircraft, and 500 feet left for the number 3 aircraft. **(T-2).**

Figure 15.1. Standard SKE Enroute Formation.



15.10.5.2. Element lead. Each element lead maintains a minimum of 12,000 feet separation from the preceding element lead, stacks up 100 ft, and maintains "00" cross-track separation. **(T-2).**

15.10.5.3. Long Missions. During long missions, mission commanders may extend enroute spacing and/or cross track to reduce fatigue, as required. **(T-3)**

15.10.5.4. Position errors. Formation aircraft detecting a significant position error immediately notify the offending aircraft to determine if the error is known. The subject aircraft immediately confirms or establish position by other available means. **(T-2).**

15.10.6. Loss of SKE.

15.10.6.1. Single aircraft. Any aircraft that loses SKE notifies lead immediately. **(T-2).** If IMC, establish a safe heading away from the formation. **(T-2).** If last aircraft in the formation loses SKE, an airspeed reduction may be used to obtain immediate separation. Lead coordinates a separate IFR clearance for the malfunctioning aircraft as needed. **(T-2).**

15.10.6.2. Entire formation. If the entire formation loses SKE, attempt to correct the malfunction by changing the selected lead, provided an alternate means of maintaining

formation position is being used (A/A TACAN, weather radar skin paint, radar beacon, TCAS). If the entire formation loses SKE and is unable to correct the malfunction or transition to a visual formation, execute inadvertent weather penetration without SKE procedures. **(T-2).**

15.10.7. Lead Change. The aborting leader commands the lead change and the new leader acknowledges receipt of this command. **(T-2).** If briefed, the change may be accomplished silently at a planned point or time. Do not accomplish lead changes in turns or descents. **(T-2).**

15.10.7.1. In IMC, the aborting leader turns 30 degrees away from base heading in the safest and most logical direction until at least 1 NM from the formation. Reset appropriate crosstrack, range, and leader number. Drift back to rejoin at the end of the formation. If VMC, the aborting leader may join at a coordinated position within the formation. **(T-2).**

15.10.7.2. The follower aircraft selects the new lead and reset crosstrack and range as required. **(T-2).**

15.10.7.3. New leader completes an FCI check (unless already accomplished). **(T-2).**

15.10.8. Recoveries. If recovering a large SKE formation and the planned approach is not a straight-in, obtain a minimum of five minutes separation between sections of six or less aircraft prior to reaching the recovery base. **(T-2).** Ensure the airspace is available for each section of six or less to hold upon arrival at the recovery base if immediate landing is not possible. **(T-2).** If aircraft weights differ significantly, the heaviest aircraft dictates the speeds flown. **(T-2).** The formation may proceed visually to the field for a visual recovery, maintain SKE spacing and assume SKE in-line formation procedures, fly ATC locally approved SKE approach, or break up for individual approaches.

15.10.8.1. Instrument approaches.

15.10.8.1.1. Do not fly 45/180 procedure ground tracks. **(T-2).**

15.10.8.1.2. Holding Pattern, Holding Pattern in Lieu of Procedure Turn, or Procedure Turn pattern entry will be within 70 degrees of the published inbound course on the non-maneuvering side or within 20 degrees on the maneuvering side and a minimum of 1,000 feet above procedure turn or GCA pickup altitude. **(T-1).** Do not enter from the quadrant requiring a turn to the non-maneuvering side.

15.10.8.1.2.1. Request 2 minute holding legs with more than 3 aircraft in formation. **Caution:** In a non-radar environment or uncontrolled airspace, lead should consider increasing the formation's minimum altitude to ensure terrain/obstacle avoidance.

15.10.8.1.3. Lead signals the turn outbound over the IAF with the FCI at station passage. All follower aircraft delay the turn outbound based on SKE timing, maintain formation interval, and complete the approach in accordance with AFMAN 11-217. Formation lead ensures all aircraft stay in the “remain within” distance for the approach or coordinate with ATC for additional airspace. **(T-2).**

15.10.9. Landing. Minimum landing interval is 10,000 feet (12,000 feet desired). **(T-2).**

15.10.10. Missed Approach. Aircraft executing a missed approach fly the published or directed procedure. **(T-2).** If weather at the airfield is reported below minimums after the approach is started, the formation executes a missed approach, maintaining 160 KCAS (or minimum flap retract, whichever is higher) and approach separation. **(T-2).** Formation lead requests individual approaches, if possible. Coordinate for holding if required. In a radar environment, give the controlling agency the order in which aircraft are to depart the flight. **(T-2).** If individual approaches cannot be obtained or approach control is not available, the formation proceeds to an alternate airfield. **(T-2).**

15.11. Formation Air Refueling Procedures. The procedures contained in this section cover only the most common receiver/tanker formations and do not cover all possible situations. The procedures contained in this section do not relieve the mission commander and section leader of the responsibility to thoroughly plan and brief these procedures and cover all possible combinations. All AAR operations will be accomplished IAW T.O. 1-C-17A-1, and ATP 3.3.4.2. **(T-2). Note:** The lead tanker is responsible for navigation of the entire formation (both tanker and receiver aircraft) from rendezvous through the end of air refueling operations. **(T-2).**

15.11.1. Briefing. The lead receiver aircraft commander briefs all aircraft commanders within the receiver cell. This briefing will be in sufficient detail to cover all phases of cell operations. **(T-2).**

15.11.2. Aircraft will have operable SKE for formation air refueling flights. **(T-3).** If WX radar is inoperative, TCAS must be operational. **(T-3).**

15.11.3. During refueling, receivers address themselves as "Receiver 1" (R1), "Receiver 2" (R2), and "Receiver 3" (R3). **(T-2).** Address the individual tankers as "Tanker 1" (T1), "Tanker 2" (T2), etc. **(T-2).**

15.11.4. Rendezvous Procedures: R1 keeps heading and airspeed changes to a minimum during transitions to or from AR echelon. **(T-2).**

15.11.4.1. When 3 receivers are maneuvering to AR echelon, R1 has the option prior to the AR Echelon call to direct R3 to assume AR position. R3 selects R2 as their LEAD and change LTRK/XTRK to 4000/R500 or in-line as required for turns. R3 reports when established in AR position. **(T-2).** If R3 has not reported in "AR position" prior to the AR echelon call, R2 maneuvers based on established procedures and does not select 3000/R5000 until approaching echelon position. **(T-2).** This option may be briefed to occur at a specific time and/or geographical location.

15.11.5. Emergency Actions: Upon losing all contact with the tanker lead or the respective tanker, or if unable to maintain formation due to disorientation, the wingman simultaneously executes the applicable lost wingman procedure while transitioning to instruments. **(T-2).**

15.11.5.1. Loss of VMC after rendezvous. In the event any aircraft momentarily and inadvertently enters into IMC, loses sight of other receivers or their respective tanker in the formation, the affected receiver informs T1 immediately. **(T-2).** If continuous radar skin paint off of the respective tanker and SKE position off of all other receivers can be maintained, all aircraft maintain their current position (awaiting AR, astern, post AR, etc.) until the formation reenters VMC. **(T-2).** If visual conditions do not return sufficiently to safely complete the formation AR procedures, T1, in coordination with the R1, takes action to ensure both altitude and lateral separation from all receivers and tankers. **(T-2).**

Subsequent receiver rendezvous may be coordinated with ATC after obtaining proper separation from the tanker formation (i.e. minimum of 2 NM and 1000 feet between the lowest tanker and highest receiver).

15.11.5.2. Loss of SKE or WX radar in IMC. The loss of SKE or radar in IMC conditions after beginning the transition to AR echelon until completion of formation AAR procedures requires immediate action by R1 and T1. **(T-2).** R1, with the approval of T1, directs the appropriate action for the affected receiver to ensure both lateral and vertical separation from all other receivers and tankers. **(T-2).**

15.11.5.3. All other receiver aircraft with station keeping ability maintain their current position (awaiting AR, post AR, etc.) until reentering VMC and are subsequently cleared by R1 and T1. **(T-2).**

15.11.5.4. Lost Wingman Procedures During Receiver AR. Immediately contact T1 and establish visual, A/A TACAN, radar, SKE, or radio contact with any co-altitude aircraft. **(T-2).** If visual, A/A TACAN, radar, SKE, or radio contact cannot be established or maintained, descend to an altitude that provides positive separation from other aircraft and decrease airspeed to ensure separation. **(T-2).**

Chapter 16

AIRDROP

16.1. General. This chapter prescribes C-17 employment procedures for all airdrop operations. For additional guidance and information, refer to T.O. 1C-17A-1-4 and AFTTP 3-3.C-17. NAS training operations are required to comply with Title 14, Code of Federal Regulations Part 105, *Paracute Operations*, current edition, restrictions. **(T-1).**

16.2. Radio Discipline. Unless used in conjunction with airdrop execution, avoid use of the words GREEN/NO DROP after the Slowdown Checklist and until completion of the Post Drop checklist. "GREEN LIGHT" can be seen or heard by the loadmaster for all drops.

16.3. NVG Airdrop. Airdrops may be accomplished on drop zones lit IAW AFI 13-217, lighting patterns (covert and overt) while wearing NVGs.

16.3.1. Pilots are authorized to perform all airdrop methods while utilizing NVGs.

16.3.2. Loadmasters are authorized to perform all equipment type airdrops while utilizing NVGs. **(T-2).** Loadmasters are prohibited from conducting personnel airdrop operations while utilizing NVGs. **(T-2).**

16.3.3. Red/NVIS (overt) or IR (covert) cargo compartment lighting is set to the lowest possible setting to accomplish the mission. Blacked out (no-light) operations in the cargo compartment are not authorized. **(T-2).**

16.4. Unmarked DZ. Non-SOLL II crews may drop to an unmarked DZ in peacetime/training operations with actual cargo/personnel provided all of the following are met:

16.4.1. Positive communication method with the DZ Controller/DZSO and drop clearance relayed. **(T-2).**

16.4.2. No “UNABLE RNP” messages present. **(T-2).**

16.4.3. No “RAIM ALERT” messages present. **(T-2).**

16.4.4. A “NO DROP” signal is established and coordinated with the ground party in the event of lost communications. **(T-2).**

16.5. Airdrop Equipment.

16.5.1. Airdrop Rigging Material. The loadmaster is responsible for obtaining a sufficient amount of rigging material to satisfy load or mission requirements. **(T-1).**

16.5.2. Pole Knives. Pole knives will be carried on all heavy equipment airdrop sorties. **(T-1).**

16.6. Safety Equipment.

16.6.1. Personnel performing duties required to be mobile in the cargo compartment during air-drop, low level operations, or threat environments will wear protective headgear (except personnel performing water jumps). **(T-1).** All other personnel in the cargo compartment will be seated with seat belts fastened. **(T-1).** Loadmasters will lower their helmet visor before opening the troop doors and keep them lowered until the troop doors are closed. **(T-1).** **Exception:** Helmet visor is not required while wearing NVG’s.

16.6.2. All occupants of the cargo compartment will either wear a parachute or an attached restraint harness, or be seated with a seat belt fastened before a troop door and/or the cargo door and ramp is opened. **(T-1).** When a troop door(s) or the cargo door/ramp is open and the aircraft is below 800 feet AGL or above 25,000 feet MSL, occupant(s) will wear a restraint harness. **(T-1).** For operations over water, when parachute(s) are required, LPU(s) will be worn. **(T-1). Exception:** For static line jumps, static lines are attached to anchor cables before troop door(s) are opened. Jumpers exiting on subsequent passes may stand and hook up with door(s) opened if they are forward of FS 1027.

16.6.2.1. The restraint harness is adjusted to allow mobility to perform duties but not to a length that would allow the wearer to fall out of the aircraft. The restraint harness will be fitted and adjusted prior to flight. **(T-2).** The lifeline is 18 feet 6 inches long. With the cargo ramp and door open the restraint harness may be connected to any tie down ring at or forward of FS 1188. With the paratroop doors open the restraint harness may be connected to any tie down ring. **Exception:** Loadmasters requiring mobility in the cargo compartment while using a restraint harness can be unattached as long as they remain forward of FS 1188 with the cargo door and ramp open or FS 1027 with the paratroop door(s) open. **Warning:** Except for a towed trooper, or emergency that threatens the survivability of the aircraft and crew, the restraint harness will not be disconnected or lengthened to a point that would allow the loadmaster to fall outside the aircraft. **(T-2).**

16.6.2.2. Aircrew Flight Equipment on Personnel Airdrops. EPOS and Life Preservers not properly secured in storage pouch will be stowed immediately prior to the airdrop. **(T-2).** Life preservers may be stowed earlier on non over water flights.

16.7. Airdrop Load Information.

16.7.1. A DD Form 1748 will be completed for all airdrop loads IAW AFJI 13-210, *Joint Airdrop Inspection Records, Malfunction Investigations, and Activity Reporting*. **(T-2).**

16.7.2. Planners and aircrew will verify chute types planned with the user during mission planning. **(T-2).** Aircrews will be made aware of chute types on planning documents. **(T-2).** At a minimum, chute type and planned drop altitude will be annotated on the Mission Data Card. **(T-2).**

16.7.3. Joint Airdrop Inspectors (JAIs) will annotate actual chute type in the remarks section of the DD Form 1748. **(T-2).**

16.7.4. During execution, aircrews will verify actual chute type loaded on the aircraft by referencing the remarks section on the DD Form 1748. **(T-2).** Crews will verify the correct drop altitude, chute type and number are entered in the MC. **(T-2).**

16.7.5. Load verification and marking. A pilot will verify with the loadmaster that the actual number and type of parachutes, load weights, sequence of extraction, and position of loads in the aircraft agree with entered mission computer data. **(T-2).** For training missions (e.g. unilateral, exercise, or JA/ATT) the PIC will ensure all equipment is marked with the aircraft call sign and date. **(T-2).** Markings are placed on the CDS bundle, platform, Sling Extraction Line Bag (SELB), and drogue line. **(T-2).** If more than one CDS bundle is dropped on the same pass, mark only the first bundle out. **(T-2).**

16.7.6. If airdrop loads and airland cargo are carried at the same time, refer to the restrictions listed in **Table 16.1**. **(T-2).** These restrictions are designed to prevent airland loads from interfering with airdrop rigging equipment.

Table 16.1. Airdrop Configuration Restrictions.

Airdrop Configuration Restrictions	
ANCHOR CABLE HEIGHT FROM AIRCRAFT FLOOR	81 INCHES AT MIDSPAN WHEN INSTALLED **(T-2)**
DISTANCE BETWEEN ANCHOR CABLES (a) CDS OR DUAL ROW (b) PERSONNEL (1) FORWARD BULKHEAD INTERMEDIATE SUPPORTS	182 INCHES **(T-2)** 122 INCHES INBOARD, 182 INCHES OUTBOARD **(T-2)** 155 INCHES INBOARD, 182 INCHES OUTBOARD **(T-2)**
AIRLAND CARGO HEIGHT	CANNOT INTERFERE WITH INSTALLED ANCHOR CABLES, OR AIRDROP RIGGING EQUIPMENT **(T-2)**
AIRLAND CARGO WIDTH ON HEAVY EQUIPMENT/DUAL ROW/CDS AIRDROPS	CANNOT OBSTRUCT VIEW OR HINDER ACCESS TO IN CASE OF EMERGENCY **(T-2)**
CDS/DUAL ROW AIRDROPS (WHEN DROPPING ONE SIDE ONLY) (a) MAXIMUM WIDTH OF AIRLAND CARGO (b) POSITION OF AIRLAND CARGO	 110 INCHES **(T-2)** AFT END OF AIRLAND CARGO FORWARD OF FS 1280 **(T-2)**
AIRLAND CARGO WIDTH ON PERSONNEL AIRDROPS	144 INCHES OR LESS WITH BOTH TROOP DOORS CONFIGURED **(T-2)** MAY BE INCREASED TO 178 INCHES OR LESS IF ONLY ONE TROOP DOOR IS CONFIGURED **(T-2)**
PERSONNEL DISTANCE FROM AIRDROP RIGGING EQUIPMENT (2)	30 INCHES MINIMUM **(T-2)**

Notes:

1. Personnel airdrops may be performed with only one troop door configured for airdrop.

2. Floor-loaded rucksacks will be secured. **(T-2).**

16.8. Required Figures of Merit (FOM)/Required Navigation Performance (RNP).

16.8.1. IMC Airdrop.

16.8.1.1. Lead may descend from minimum IFR enroute altitudes to IMC drop altitude as long as UNABLE RNP messages are not displayed. IMC airdrop requires no UNABLE RNP message when using MC guidance. For SKE airdrops, wingmen may descend to IMC drop altitude and drop off the SKE timer regardless of MC ANP status, and drop off leads SKE timer.

16.8.2. JPADS/Improved Container Delivery System (ICDS).

16.8.2.1. Aircraft cannot drop with an UNABLE RNP message. **(T-2).**

16.9. Notice To Airmen (NOTAM) Requirements.

16.9.1. Airdrop Notice to Airmen. For IFR airdrop in uncontrolled airspace a Letter of Agreement between local ATC and the military is required. Also, provide a NOTAM to the FAA Flight Service Station nearest the objective area at least 6 hours in advance of the intended activity, regardless of actual or forecast weather. NOTAM information includes:

16.9.1.1. The name of the city or town nearest the route segment and the state. **(T-2).**

16.9.1.2. The date and time period of planned activity. **(T-2).**

16.9.1.3. The number and type of aircraft expected on the route. **(T-2).**

16.9.1.4. The ingress and egress points of the route segment expressed in fix/radial/distance from a very high frequency omnidirectional range. **(T-2).**

16.9.1.5. The altitude at which the aircraft is flown. **(T-2).**

16.10. Minimum Drop Altitudes.

16.10.1. Day VMC Drop Altitude. Fly minimum airdrop as specified in AFI 11-231, *Computed Air Release Point Procedures,* visually avoiding high terrain and obstacles in the vicinity of the drop zone.

16.10.1.1. During training, flight below 500 feet AGL is only authorized on approved routes in accordance with **paragraph 16.5.7.2**.

16.10.2. Night Drop Altitude. If not on NVGs, fly no lower than an indicated altitude of 500 feet above the highest obstruction to flight (man-made obstacle, terrain feature, spot elevation, or DTED spot elevation) within 3 NM of run-in centerline from slowdown through escape, or as specified in AFI 11-231, whichever is higher. **(T-2). Note:** If DTED is not available, Night Drop Altitude will be calculated using 400 feet plus one chart contour interval above the

highest depicted terrain contour, if higher. **(T-2).** After slowdown, when the drop zone is in sight and remains in sight, or when a positive position is identified and adequate terrain and obstacle clearance is assured, the aircraft may descend to the AFI 11-231 specified minimum drop altitude. **(T-1).**

16.10.3. NVG Drop Altitude. Fly NVG En Route Altitude though slowdown. Maintain the tactical corridor. After slowdown, when the DZ is in sight and remains in sight, or when a positive position is identified and adequate terrain and obstacle clearance is assured, the aircraft may descend to the AFI 11-231 specified minimum drop altitude

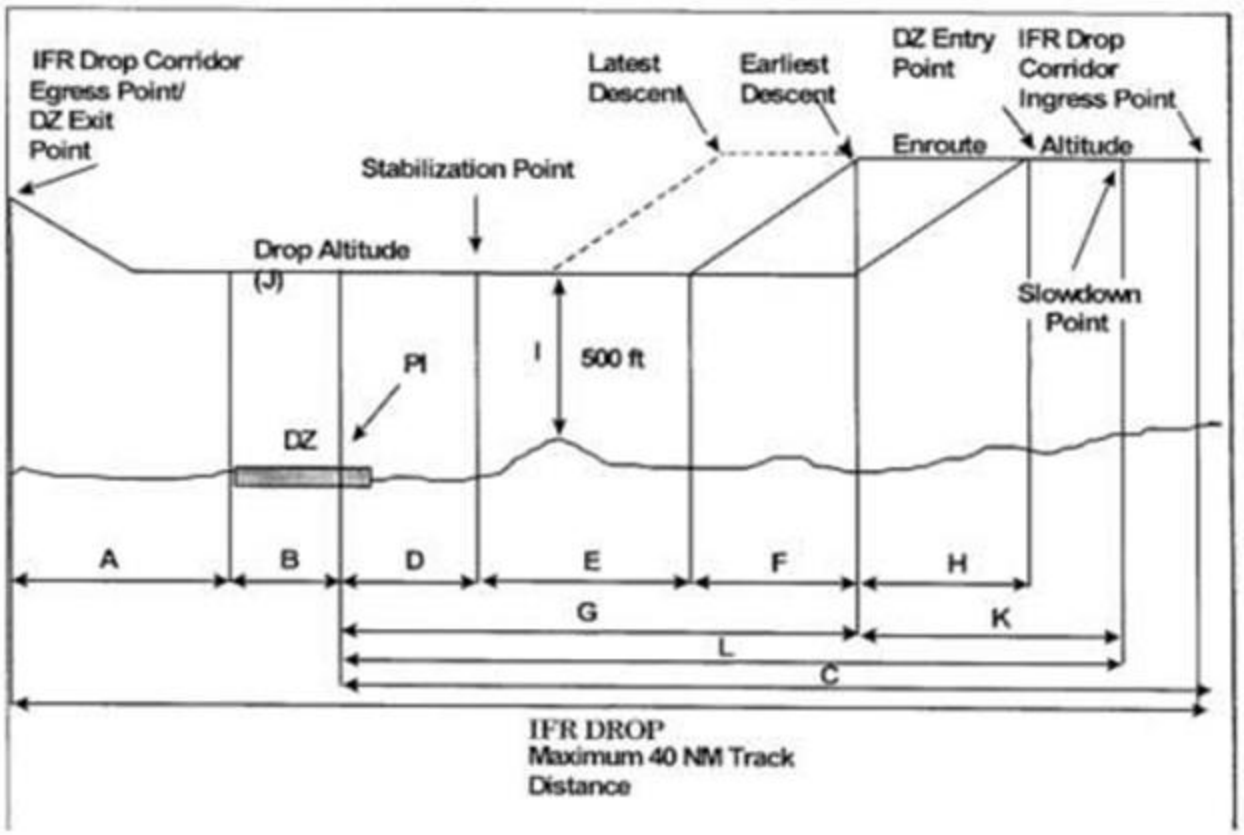
16.10.3.1. NLT 3 NM prior to any charted man-made obstacle within the run-in corridor, the aircrew must visually identify the obstacle. **(T-1).** If the obstacle is not identified by 3NM, climb to 500 feet above the obstacle until the aircrew confirms the aircraft is past the obstacle. **(T-1).**

16.10.4. IMC drop altitude is 500 feet above the highest obstruction to flight within 3 NM of run-in centerline from DZ entry point to DZ exit point. **(T-1).** If DTED is not available, IMC drop altitude will be calculated using 400 feet plus one chart contour interval above the highest depicted terrain contour, if higher. **(T-1).** ***WARNING:*** Drop zone surveys do not assure terrain and obstruction clearance. The responsibility is incumbent upon planners and aircrew through thorough mission planning and chart updating. **Note:** AFI 11-231 minimum chute altitudes may require the aircraft to drop at a higher altitude than those listed above.

16.10.4.1. A route-specific FAR 4371 exemption is not required to operate at IMC drop altitude in Special Use Airspace that supports operations at that altitude (e.g. an MTR/MCA/Restricted Area with a floor of 300 feet AGL).

16.11. IFR Drop Profile.

Figure 16.1. IFR Airdrop Profile.



16.11.1. IFR Drop Corridor (See **Figures 16.1** and **16.2**). The IFR Drop Corridor is the corridor where aircraft may operate below IFR en route altitude. The beginning of the corridor, the IFR Drop Corridor Ingress Point, is a maximum of 40 miles from the IFR Drop Corridor Egress Point (co- located with the DZ Exit Point). Plan segmented corridor altitudes not lower than 500 feet above the highest obstruction to flight (man-made obstacle, terrain feature, or charted or DTED spot elevation), within 3 nautical miles of centerline. **Note:** If DTED is not available, IFR Drop Corridor altitudes will be calculated using 400 feet plus one contour interval above the highest depicted terrain contour, if higher.

16.11.1.1. Drops conducted through or originating from IMC are only authorized from within or above an active restricted area or military operations in uncontrolled airspace.

16.11.1.2. In addition to required RNP, do not initiate descent from the minimum IFR en route altitude to IMC drop altitude unless all aircraft in the element are inside the DZ entry point, on course, with element lead's position positively known. **Note:** The 40 NM IFR Drop Corridor is an agreement with the FAA in designated FAA airspace. When conducting IFR airdrops outside FAA airspace, reference these IFR drop corridor procedures for planning purposes, however, the 40 NM restriction does not apply

16.11.2. IFR DZ Entry Point. A fixed point in the IFR Drop Corridor where an aircraft or formation may safely begin descent from IFR en route altitude or a segmented altitude to IMC drop altitude. Formation descent will not begin until the last aircraft is at or past the DZ entry point.

16.11.3. Earliest Descent Point (EDP). Earliest point in the IFR Drop Corridor where the formation lead may descend the entire formation to IMC drop altitude and be assured of terrain clearance for the entire formation. Computed by subtracting formation length (e.g., a 4-ship is 2 NMs long) from the computed DZ entry point. A minimum of 6 NM stabilization point is recommended in IMC.

16.11.4. IMC Stabilization Point. The point after the DZ entry point where the lead aircraft will plan to be stabilized at IMC drop altitude and airspeed (normally 6NM from the Point of Impact (PI)).

16.11.5. Latest Descent Point (LDP). Latest possible point in the IFR corridor where formation lead may begin descent to IMC drop altitude and be assured of terrain clearance for the entire formation. This is the latest point that ensures all aircraft in the formation are stabilized on altitude and airspeed.

16.11.6. IFR DZ Exit Point. A fixed point on the DZ escape flight path centerline where each aircraft will be at minimum IFR en route altitude. Calculate the exit point based upon three-engine performance at airdrop gross weight. This point will be a minimum of 4 NMs track distance from the trailing edge of the DZ. Also referred to as the IFR Drop Corridor Egress point.

Table 16.2. IMC Drop Profile Calculation.

A DZ Exit Point. Compute this distance as 1 minute at 160 KCAS + climb at 1000 FPM or as briefed (no greater than 3 engine climb performance). Climb at least 500 FPM or as required by terrain/obstructions. Cannot be less than 4	Write Here
B DZ Length (Total DZ Length-Leading edge to PI Distance/2025 yd/NM) Example: (1688-550)/2025 = .6 NM	
C IFR Drop Corridor Entry Point. Computed by subtracting distances A and B above from 40 NM. Example: (40 NM - A - B) 40 - 4.1 - .6 = 35.3 NM	
D IMC Stabilization Point. Recommended at least 6 NM from the PI, the mission commander may extend this distance. Example: 6 NM	
E Slowdown from 160 KCAS to Drop Speed. Example 160 to 145 KCAS = .7 NM (See attached slowdown distance table)	
F Descent from IFR en route to IFR drop altitude. Example Descent from 2000' to 1000' MSL = 2.7 NM (@ 160 GS and 1000 FPM see attached distance	
G Formation Length (3-ship elements, no ghosts) 2-ship .7 NM 3-ship 1.3 NM 4-ship 2.0 NM 5-ship 2.6 NM 6-ship 3.3 NM Example: 3-ship 1.3 NM	
H DZ Entry Point. To extract this distance compute the slowdown point for the last aircraft and subtract the initial deceleration distance, or add D + E + F+G above. Example (D+E+F+G) 6 + .7 +2.7 +1.3= 10.7 NM Verify the result is not greater than the IFR Drop Corridor Entry Point.	
I Minimum IFR Drop Altitude. Example: 716 +500 = 1216'	

J Planned Drop Altitude. Highest point on DZ plus AGL drop altitude. Will not be less than IFR Drop Altitude. Example: 289 + 800 = 1089’ (use higher of min	
K Initial Slowdown Distance. Distance needed to slow from en route airspeed to 160 KCAS* (see attached table)	
L Slowdown Distance (See Table 16.3). Total distance from initial slowdown to PI. Item K + Item F + Item E + Item D Example (from 240 KCAS to drop airspeed, 2000’ to 1216’) 4.7 + 2.7 +.7 + 6 = 14.1 NM	

Table 16.3. Slowdown Distance (part 1 of 3).

ENDING GROUNDSPEED									
		130	140	150	160	170	180	190	200	210
STARTING GROUNDSPEED	370	17.5	17.1	16.7	16.2	15.7	15.2	14.7	14.1	13.5
	360	16.4	16.0	15.6	15.2	14.7	14.2	13.6	13.1	12.5
	350	15.4	15.0	14.6	14.1	13.6	13.1	12.6	12.0	11.4
	340	14.4	14.0	13.6	13.1	12.6	12.1	11.6	11.0	10.4
	330	13.4	13.0	12.6	12.1	11.7	11.2	10.6	10.0	9.4
	320	12.5	12.1	11.6	11.2	10.7	10.2	9.7	9.1	8.5
	310	11.5	11.2	10.7	10.3	9.8	9.3	8.7	8.2	7.6
	300	10.7	10.3	9.8	9.4	8.9	8.4	7.9	7.3	6.7
	290	9.8	9.4	9.0	8.5	8.0	7.5	7.0	6.4	5.8
	280	9.0	8.6	8.1	7.7	7.2	6.7	6.2	5.6	5.0
	270	8.2	7.8	7.3	6.9	6.4	5.9	5.4	4.8	4.2
	260	7.4	7.0	6.6	6.1	5.6	5.1	4.6	4.0	3.4
	250	6.6	6.3	5.8	5.4	4.9	4.4	3.8	3.3	2.7
	240	5.9	5.5	5.1	4.7	4.2	3.7	3.1	2.6	2.0
	230	5.2	4.9	4.4	4.0	3.5	3.0	2.4	1.9	1.3
	220	4.6	4.2	3.8	3.3	2.8	2.3	1.8	1.2	0.6
	210	4.0	3.6	3.1	2.7	2.2	1.7	1.2	0.6	0.0
	200	3.4	3.0	2.6	2.1	1.6	1.1	0.6	0.0	

TABLE A (SLOWDOWN DISTANCES)

Table 16.4. Slowdown Distance (part 2 of 3).

GROUNDSPEED

DESCENT	1000 FPM	200	190	180	170	160	150	140	130	120
	1000	3.3	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.0
	2000	6.7	6.3	6.0	5.7	5.3	5.0	4.7	4.3	4.0
	3000	10.0	9.5	9.0	8.5	8.0	7.5	7.0	6.5	6.0
	4000	13.3	12.7	12.0	11.3	10.7	10.0	9.3	8.7	8.0
	5000	16.7	15.8	15.0	14.2	13.3	12.5	11.7	10.8	10.0
	6000	20.0	19.0	18.0	17.0	16.0	15.0	14.0	13.0	12.0

DISTANCE	1500 FPM	200	190	180	170	160	150	140	130	120
	1000	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.4	1.3
	2000	4.4	4.2	4.0	3.8	3.6	3.3	3.1	2.9	2.7
	3000	6.7	6.3	6.0	5.7	5.3	5.0	4.7	4.3	4.0
	4000	8.9	8.4	8.0	7.6	7.1	6.7	6.2	5.8	5.3
	5000	11.1	10.6	10.0	9.4	8.9	8.3	7.8	7.2	6.7
	6000	13.3	12.7	12.0	11.3	10.7	10.0	9.3	8.7	8.0

ESS	2000 FPM	200	190	180	170	160	150	140	130	120
	1000	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.0
	2000	3.3	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.0
	3000	5.0	4.8	4.5	4.3	4.0	3.8	3.5	3.3	3.0
	4000	6.7	6.3	6.0	5.7	5.3	5.0	4.7	4.3	4.0
	5000	8.3	7.9	7.5	7.1	6.7	6.3	5.8	5.4	5.0
	6000	10.0	9.5	9.0	8.5	8.0	7.5	7.0	6.5	6.0

TABLE B (SLOWDOWN DISTANCES)

Table 16.5. Slowdown Distance (part 3 of 3).

			ENDING GROUNDSPEED									
			100	110	120	130	140	145	150	160	170	180
	G	190	3.8	3.5	3.2	2.8	2.4	2.2	2.0	1.5	1.0	0.5
S	R	180	3.3	3.0	2.6	2.3	1.9	1.7	1.4	1.0	0.5	0.0
T	O	170	2.8	2.4	2.1	1.7	1.4	1.1	0.9	0.5	0.0	
A	U	160	2.3	2.0	1.6	1.3	0.9	0.7	0.5	0.0		
R	N	150	1.8	1.5	1.2	0.8	0.4	0.2	0.0			
T	D	140	1.4	1.1	0.8	0.4	0.0					
I	S	130	1.0	0.7	0.4	0.0						
N	P	120	0.6	0.3	0.0							
G	E	110	0.3	0.0								
	E	100	0.0									
	D		TABLE C (SLOWDOWN DISTANCES)									

16.12. VFR Drop Profile.

16.12.1. VFR DZ Entry Point. A fixed point in the Drop Corridor where the aircraft or formation transitions from VFR en route procedures to VFR airdrop procedures (normally the planned slowdown point).

16.12.2. VFR DZ Exit Point. A fixed point on the DZ escape flight path centerline where each aircraft will be at minimum VFR en route altitude. Calculate the exit point based upon three-engine performance at airdrop gross weight. **(T-2).**

16.13. Dual Row.

16.13.1. Reference dual row drop altitudes in accordance with Cargo Parachute Ballistic Data for C-17 Aircraft.

16.13.2. Formation Dual Row. Formation airdrop of dual row platforms is authorized from any position in the element.

16.13.2.1. Increase minimum drop zone width by 400 yds (200 yds each side) in addition to AFI 13-217 minimum drop zone calculations. **(T-2).**

16.13.3. Crews will not use autopilot/autothrottles during the airdrop sequence; the autopilot/autothrottles will not maintain correct deck angle. **(T-2).**

16.14. High Altitude Airdrop Operations.

16.14.1. For communications and signals, interphone and hand signals are the primary methods of communications. Written messages may be necessary in some instances to communicate with individuals not connected to the aircraft interphone. Loadmasters will carry

a suitable writing utensil and medium to write out messages that cannot be dealt with by using hand signals. **(T-3).** When dropping parachutists, the jumpmaster may monitor interphone. The loadmaster will coordinate all hand signals with the jumpmaster. **(T-3).**

16.14.2. Crewmembers will wear parachutes or restraint harnesses in the cargo compartment any time the doors are open during high altitude airdrop operations. **(T-1).** Safety harnesses shall be worn on airdrops conducted above 25,000 feet MSL. (LPUs must be worn with parachutes for operations over bodies of water with the doors open). **(T-1).**

16.14.3. Maintain interphone contact between the cockpit and the cargo compartment. The loadmaster must be on interphone from completion of pre-slowdown checks until execution of the completion of drop checklist and the cabin altitude is below 10,000 feet. **(T-2).** The jumpmaster may also monitor interphone during high altitude personnel airdrops.

16.15. High Altitude Airdrop Oxygen Requirements.

16.15.1. **See AFI 11-409, *High Altitude Airdrop Mission Support Program*, for high altitude airdrop operations oxygen requirements (pre-breathe requirements and exposure limits, restrictions, Physiological Technician requirements, etc.)**

16.16. High Altitude Personnel Airdrop Procedures. Ensure any paratroopers remaining on-board de-arm their parachutes before cabin altitude descends below set parachute activation altitude. **(T-2).**

16.16.1. Air deflectors must be operational if paratroop doors are used. **(T-2).** If an air deflector does not extend, do not open the affected troop door. **(T-2).**

16.16.2. The ramp and door or paratroop door may remain open during racetracks if required, provided racetrack altitude is at or above a safe drop altitude and paratroopers are rigged for high altitude airdrops.

16.16.3. For High Altitude Low Opening (HALO)/High Altitude High Opening (HAHO) drops, the allowable methods determining the release point are launch acceptability region (LAR) using a MAJCOM-approved source (e.g. Consolidated Airdrop Tool (CAT)), AFI 11-231, Jumpmaster directed, or user defined (jointly agreed upon release point/region).

16.16.3.1. For LAR drop, the green light will be turned on when entering the LAR, and the red light will be turned on when exiting the LAR. **(T-2).** The pilot will provide a standard "Green Light" call at the jointly agreed upon release point. User assumes responsibility for drop accuracy once a release point/LAR has been jointly agreed upon. **(T-2).**

16.16.3.2. For High Altitude Release Point (HARP) Jumpmaster directed HAHO/HALO drops, the green light may be turned on one minute prior to the release point. The pilot will provide a standard "Green Light" call at the jointly agreed upon release point. **(T-2).** User assumes responsibility for drop accuracy.

16.16.3.3. SOLL II crews are authorized to drop on a special operations user specified release point. User assumes responsibility for drop accuracy.

16.16.4. Normally, the jumpers will exit the aircraft at their own discretion; however, their exit must occur during the green light time. **(T-2).**

16.16.5. Ensure any paratroopers remaining on-board de-arm their parachutes before cabin altitude descends below set parachute activation altitude. **(T-2).**

16.17. Personnel Airdrop.

16.17.1. Drop parameters. Aircraft will no-drop if not within the following tolerances at green light. **(T-2).**

16.17.1.1. Element leads must maintain a minimum of 32,000 feet to preceding element lead. **(T-2).**

16.17.1.2. Wingman Spacing Within Elements (For up to 12 Degrees of Drift). The second aircraft in each element will be positioned 3,000 feet aft and 650 feet right for a right echelon, 650 feet left for a left echelon. **(T-2).** The third aircraft in each element will be positioned 6,000 feet aft and 1,500 feet right for a right echelon, 1,500 feet left for a left echelon. **(T-2).** For drifts greater than 12 degrees, use appropriate spacing in **Table 16.6**. **(T-2).** Lead signals the direction of echelon and expected drift prior to the pre-IP. **(T-2).** Wingmen reset longtrack on lead's command and automatically echelon in the descent to drop altitude (or on lead's command in case of level slowdown or pop-up). **(T-2).** Compression to 3,000-6,000 foot spacing should be initiated not later than the slowdown point. All elements fly the same drop altitude. **(T-2).**

Table 16.6. Personnel Formation Drift.

PERSONNEL FORMATION DRIFT		
Drift	#2 Wing	#3 Wing
L/R	L/R	L/R
1 to 12	650	1500
13	700	1500
14	750	1500
15	800	1600
16	850	1750
17	950	1850
18	1000	1950
19	1050	2050
20	1100	2200

16.17.1.3. Wingmen restrictions are ±500 feet fore/aft, ±200 feet left/right of position. **Warning:** If the second aircraft is not within these tolerances, a no drop will be called for both Number Two and Number Three aircraft by Number Two. **(T-2). Note:** To prevent course correction at mission computer red light, consider using split axis or heading hold.

16.18. Slowdown Planning. For equipment and CDS drops, the aircraft should be at drop altitude and drop airspeed by 10 seconds prior to the computed air release point. During personnel drops, the aircraft should be at or above drop altitude and at airspeed not later than 1 minute to go (2 minutes for jumpmaster-directed drops) to allow the jumpmasters access to the paratroop doors.

16.19. Navigation to the Computed Air Release Point (CARP). The primary method for navigating to the CARP is using a MC-calculated release solution updated with GPS. Alternate approved methods include SKE, Ground Radar Aerial Delievery System (GRADS), Ground Marked Release System (GMRS), and Verbally Initiated Release System (VIRS). With MAJCOM/A3 approval, pilot-directed airdrop (PDA) is also available.

16.19.1. The PF is responsible for ensuring the aircraft is positioned at the release point at green light and for maintaining drift-corrected track through red light. The PM is responsible for ensuring a countdown to green light, the green light call, and the red light calls are given.

16.19.2. Element Lead. After slowdown, each element lead flies an independent run-in to the CARP. **(T-2).**

16.19.3. Pilot-Directed Airdrops. SOLL-II, 57 WPS cadre, and pilots who successfully accomplished the AMC approved PDA training syllabus are authorized to conduct pilot directed airdrops. All others require MAJCOM/A3 approval before accomplishing actual pilot directed airdrops. **Exception:** Pilot directed airdrops may be accomplished by any airdrop pilot for training on dry passes.

16.20. GPS Airdrop. A 300 yard preflight drop box will be computed and updated prior to initiation of the release point checklist. **(T-2).** If the aircrew determines that the aircraft will be outside the drop box at green light, a no drop will be called. **(T-2).**

16.20.1. During the Slowdown Checklist, the following items must be confirmed if planning to drop in IMC:

16.20.1.1. At least one GPS receiver will be updating with no "RAIM ALERT" messages present. **(T-2).**

16.20.1.2. No "DEGRADED NAV ACC" or “UNABLE RNP” messages will be present. **(T-2).**

16.20.2. Crews will load GPS crypto for all airdrop operations to enhance GPS accuracy. **(T-2).**

16.21. JPADS/ICDS Airdrop.

16.21.1. JPADS certified POs are authorized to use the JPADS mission planner and software to calculate release points for JPADS/ICDS airdrop operations

16.21.2. The PO or mission planner is required to provide Joint Precision Airdrop System-Mission Planner (JPADS-MP) derived CARP(s) for each airdrop pass and a completed Airdrop Damage Estimate (ADE) prior to an airdrop mission. Both pilots will review preflight CARP(s)/ADE for each respective airdrop. **(T-2).**

16.21.3. Airdrop Damage Estimate (ADE). Units must perform a full ADE prior to JPADS/ ICDS airdrops. **(T-2)**. The ADE must be coordinated and approved by the area controlling agency. **(T-2)**. Coordinate with the owning agency of the restricted airspace or controlled airspace and landowners with property surrounding the DZ for all JPADS/ICDS operations. Examine the area in the vicinity of the DZ for potential damage or hazards in the course of normal operations or during extraordinary system failure events. If the ADE demonstrates potential damage or hazards restrict airdrop release launch acceptability region (LAR), lower the drop altitude, change the run-in, change parachute type or cancel operations. Inform the

controlling unit of the risk to their operations; the controlling unit, and the Joint Force Controller (JFC) designated agency are approving authorities for risk to the area surrounding the DZ. Intelligence personnel are responsible for providing the JFC-designated agency close-up and overview imagery to facilitate ADE. For actual JPADS training drops, AMC units are required to contact their Wing Tactics two weeks prior in order to ensure all planning, coordination and reviews/assessments have been accomplished. **(T-3)**. Operations conducted at Yuma Proving Ground under JPADS related tests plans do not need Wing Tactics review. See AFTTP 3-3.C17 and AFI 13-217 for further information. The ADE must include, at a minimum, a review of the airspace and ground space with respect to: **(T-2)**.

16.21.3.1. CARP and LAR location.

16.21.3.2. ICDS success ellipse.

16.21.3.3. Chute failure footprint.

16.21.3.4. Guidance failure footprint.

16.21.4. Weather restrictions. CONUS training drops in/through IMC will be flown IAW **para 16.11.1.1**. **(T-2)**.

16.21.4.1. JPADS parachutes will not be dropped through severe turbulence or severe icing. **(T-2)**.

16.21.4.2. Wind Limits. Surface wind limitations are unrestricted for dropsonde operations, 17 knots for JPADS Ultra-Light Weight (ULW)/2K/2K-M/10K, and as published in AFI 13-217 for all other parachutes.

16.21.5. When dropping JPADS, dropsondes are not required. When dropping near the edge of the LAR or in strong/variable wind conditions, dropping a dropsonde is recommended to improve the drop solution and reduce risk.

16.21.6. Altitude and Weight Limits

16.21.6.1. JPADS 2K/2K-M operations conducted from 5,000 feet AGL to 24,5000 feet MSL have a weight range of 850 to 2,280 lbs rigged weight. **(T-2).** Training payloads may be dropped as low as 3,500 feet AGL. When dropping 3,500 to 5,000 feet AGL, payload weights will be within 1,380 to 1,780 lbs rigged weight.

16.21.6.2. JPADS 10K operations conducted from 5,000 feet AGL to 24,500 feet MSL have a weight range of 5,000 to 10,000 lbs rigged weight. **(T-2).** Training payloads may be dropped as low as 3,500 feet AGL.

16.21.7. Drop zone Size. Drop zone size criteria for JPADS and ICDS drops during contingency operations is at the discretion of the user. AFI 13-217 drop zone size restrictions apply during training.

16.21.8. JPADS Guided and Dropsonde Footprint Locations. During normal training operations, a JPADS and Dropsonde DZ, CARP, chute failure footprint and guidance failure footprint will be located within a restricted airspace. If winds force the CARP outside of restricted airspace additional coordination with ATC is required prior to airdrop operations. This includes coordination with the ATC agency, filing a Notices to Airmen (NOTAM), and ensuring airspace is clear for the entire guided system‘s flight profile from the drop altitude to the ground. **(T-2)**.

16.21.9. During training operations, the entire ICDS success footprint will be located within the surveyed DZ boundaries. The chute failure footprint must fall within restricted airspace. If outside of a restricted airspace the chute failure must fall on the surveyed DZ. If operating in a restricted area and winds force the CARP outside of restricted airspace coordination with ATC is required prior to airdrop operations. This includes coordination with the ATC agency, filing a NOTAM and ensuring airspace is clear from the drop altitude to the ground. **(T-2)**.

16.21.10. JPADS AGU MILGPS Procedures. Follow MILGPS keying procedures contained in T.O. 13C7-49-61 and T.O. 137-49-51. The JPADS contains a Selective Availability Anti-Spoofing Module (SAASM) GPS within the guidance unit (referred to as "JPADS MILGPS"). The JPADS MILGPS is approved to receive crypto-variable GPS keys and is an UNCLASSIFIED but controlled item and must be handled to preclude unauthorized access, tampering, theft, or loss. Due to the general application and associated security protocols, black GPS keys will be used. **(T-2)**.

16.21.10.1. When programing JPADS guidance units, the following items are the most critical and must be verified after the final data transfer, or at any point prior to the airdrop: **(T-3)**.

16.21.10.1.1. The intended impact point coordinates in latitude/longitude or MGRS ("LAT/LON or "MGRS").

16.21.10.1.2. The elevation of the intended impact point ("IP Elev").

16.21.10.1.3. The JPADS parachute type used ("Canopy").

16.21.10.1.4. Total rigged weight of the airdrop load ("Weight").

16.21.10.2. The transfer of the mission file from the JPADS Mission Planner is not necessary if all programed information within the guidance unit has been reviewed and validated as correct.

16.21.10.3. Jettison of JPADS AGU with Military GPS (MILGPS). Instances of jettison of the JPADS with MILGPS must be reported to the GPS Controlling Authority (CA). Each such- report shall include the Avionics Module/enclosure serial number and must state whether the system was keyed or unkeyed. This serial number was previously recorded on the DD Form 1748-5 during the JAI Inspection. Reporting shall be completed using the form contained in T.O. 13C7-49-61 and submitted to US Army Soldier Systems Center, Assistant Product Manager (APM) Cargo Aerial Delivery Systems Team, Product Manager Force Sustainment Systems (PM FSS) SFAE-CSS-FP-F, 10 General Greene Avenue, Natick, MA 01760-5057. **(T-2)**.

16.21.10.3.1. Time permitting; the LM, with concurrence from the PIC/PO, will remove the Avionics Module from the JPADS prior to load jettison. **(T-2).**

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Attachment 1

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Abbreviations and Acronyms

AAR—Air to Air Refueling

AC—Aircraft Commander

ACL—Allowable Cargo Load

ACO—Airspace Control Order

AD—Airdrop

ADE—Airdrop Damage Estimate

ADTD—Aircraft Data Transfer Device

AGE—Aircraft Ground Equipment

ADIZ—Air Defense Identification Zone

AFGM—Air Force Guidance Memorandum

AFRC—Air Force Reserve Command

AIRAC—Aeronautical Information Regulation and Control

ALS—ALPHA Limit System

ALZ—Assault Landing Zone

AMD—Air Mobility Division

AME—Air Mobility Element

ANP—Actual Navigation Performance

ANG—Air National Guard

AOR—Area of Responsibility

AP—Autopilot

APEX—Aerial Port Expeditor

APPR—Approach

APU—Auxiliary Power Unit

ARCT—Air Refueling Control Time

ARTCC—Air route Traffic Control Center

ASR—Airport Surveillance Radar

ASRR—Airfield Suitability and Restriction Report

AT—Autothrottles

ATC—Air Traffic Control

ATCSCC—Air Traffic Control System Command

ATIS—Automatic Terminal Information Service

ATO—Air Tasking Order

ATOC—Air Terminal Operations Center

ATT—Attitude

BRNAV—Basic Area Navigation Airspace

C2—Command and Control

CA—Control Access

CARP—Computed Air Release Point

CAT—Consolidated Airdrop Tool

CCM—Command and Control Module

CDT—Crew Duty Time

CRE/CRGs—Contingency Response Elements/Groups

CFP—Computer Flight Plan

CHOP—Changed Operational Control

COMAFFOR—Commander Air Force Forces

CRM—Crew Resource Management

CSS—Chief Servicing Supervisor

CVAM—Assistant Vice Chief of Staff of the Air Force, Special Air Missions

CVR—Cockpit Voice Recorder

DA—Decision Altitude

DAFIF—Digitial Aeronautical Flight Information File

DCP—Dynamic Cone Penetrometer

DCS—Defense Courier Service

DIRMOBFOR-AIR—Director of Mobility Forces-Air

DH—Decision Height

DRT—Derated Thrust

DTED—Digital Terrain Elevation Data

EAR—End Air Refueling

EBL—Emergency Boom Latching

ED—Engineering Disposition

EDP—Earliest Decent Point

EFB—Electronic Flight Bag

ENAME—Europe North Africa and Middle East

EPA—Evasion Plan of Action

EPOS—Emergency Passenger Oxygen System

ERO—Engine Running Onload/Offload

ETA—Estimated Time of Arrival

ETE—Estimated Time Enroute

ETIC—Estimated Time in Commission

ETP—Equal Time Point

FAA—Federal Aviation Adminstration

FAF—Final Approach Fix

FCF—Functional Check Flight

FCG—Foreign Clearance Guide

FCI—Flight Command Indicator

FD—Flight Director

FDP—Flight Duty Period

FFS—Formation Flight System

FLIP—Flight Information Publication

FMS—Flight Management System

FOD—Foreign Object Damage

FOL—Forward Operating Location

FRAG—Fragmentary Order

FTU—Formal Training Unit

GDSS—Global Decision Support System

GMRS—Ground Marked Release System

GNC—Global Navigation Charts

GPS—Global Positioning System

GPWS—Ground Proximity Warning System

GRADS—Ground Radar Aerial Delievery System

HAHO—High Altitude High Opening

HALO—High Altitude Low Opening

HARP—High Altitude Release Point

HAT—Height Above Touchdown

HATR—Hazardous Air Traffic Report

HUD—Heads Up Display

IAF—Initial Approach Fix

IAW—In Accordance With

IC—Interim Change

ICDS—Improved Container Delivery System

ICS—Intercom Control Set

ID—Identification

IFF—Identification Friend or Foe

IFM—Integrated Flight Management

ILS—Instrument Landing System

INS—Inertial Navigation System

IP—Instructor Pilot

JA/ATT—Joint Airborne/Air Transportability Training

JFC—Joint Force Controller

JG—Job Guide

JI—Joint Inspection

JNC—Joint Navigation Charts

JOG—Joint Operation Grphics

JPADS—Joint Precision Airdrop System

JPADS-MP—Joint Precision Airdrop System-Mission Planner

KCAS—Knots Calibrated Airspeed

LAAS—Local-Area Augmentation System

LAIRCM—Large Aircraft Infrared Counter-Measure

LAR—Launch Acceptability Region

LPU—Life Preserver Unit

LSK—Line Select Key

LZ—Landing Zone

MAF—Mobility Air Forces

MAFPS—Mobility Air Forces Automated Flight Planning System

MAJCOM—Major Command

MAP—Missed Approach Point

MAWP—Missed Approach Waypoint

MBL—Manual Boom Latching

MC—Mission Capable

MCD—Medical Crew Director

MDS—Mission Design Series (e.g., KC-135)

ME—Mission Essential

MEL—Minimum Equipment List

MEP—Mission Essential Personnel

MHE—Material Handling Equipment

MILGPS—Military Global Positioning Equipment

MMO—Mission Mobility Observers

MNPS—Minimum Navigation Performance Specifications

MOB—Main Operating Base

MR—Mision Ready

MSA—Minimum Safe Altitude

MSL—Mean Sea Level

NAS—National Airspace System

NDB—Non Directional Beacon

NGA—National Geospacial Agency

NM—Nautical Mile

NOTAM—Notice to Airmen

NVG—Night Vision Goggles

OCF—Operational Check Flight

OCS—Obstacle Clearance Surface

OI—Operating Instruction

ONC—Operational Navigation Chart

OSI—Office of Special Investigation

OPORD—Operations Order

PAA—Primary Assigned Aircraft

PDA—Pilot Directed Airdrop

PF—Pilot Flying

PFD—Primary Flight Display

PFR—Primary Flight Reference

PI—Point of Impact

PIC—Pilot In Command

PIQ—Pilot Initial Qualification

PM—Pilot Monitoring

PPI—Plan Position Indicator

PPR—Prior Permission Required

PMSV—Pilot to Meteorologist Service

PRM—Precision Runway Monitor

PSP—Patient Support Pallet

RA—Resolution Advisory

RAT—Ram Air Turbine

RCAM—Runway Condition Assement Matrix

RNAV—Area Navigation

RNP—Required Navigation Performance

ROC—Required Obstacle Clearance

RRFL—Required Ramp Fuel Load

RSC—Runway Surface Condition

RVR—Runway Visibility Reading

RVSM—Reduced Vertical Separation Minimum

SA—Situational Awareness

SAAM—Special Assignment Airlift Mission

SAASM—Selective Availability Anti-Spoofing Module

SELB—Sling Extraction Line Bag

SID—Standard Instrument Departure

SKE—Station Keeping Equipment

SLICC—Senior Leader In-Transit Conference Capsule

SLIP—Senior Leader In-Transit Pallet

SPINS—Special Instructions

SPRO—Semi-Prepared Runway Operations

SOLL II—Special Operations Low Level II

TACC—Tanker Airlift Control Center

TAWS—Terrain Awareness Warning System

TCAS—Traffic Alerting and Collision Avoidance System

TO—Technical Order

TOGA—Takeoff Go-Around

TOLD—Takeoff and Landing Data

TPC—Tactical Pilot Chart

UIR—Upper Information Region

ULW—Ultra Light Weight

WAAS—Wide-Area Augmentation System

WWNDB—Worldwide Navigation Database

VDI—Vertical Deviation Indicator

VIRS—Verbally Initiated Release System

VVOD—Vector Vertical Obstruction Data

XMIT—Transmit

ZAR—Zone Availibility Report

Terms

Aeromedical Evacuation (AE)—Movement of patients under medical supervision between medical treatment facilities (MTFs) by air transportation.

Airdrop Damage Estimation (ADE)—A balance of science and art that produces the best estimate of potential damage concerns.

Air Force Component Commander (AFCC)—In a unified, sub-unified, or joint task force command, the Air Force commander charged with the overall conduct of Air Force air operations.

Airlift—Aircraft is considered to be performing airlift when manifested passengers or cargo is carried.

Air Mobility Control Center (AMCC)—Provides global coordination of tanker and airlift for AMC and operationally reports to the 618 AOC (TACC). Functions as the AMC agency that manages and directs ground support activities and controls aircraft and aircrews operating AMC strategic missions through overseas locations.

Air Mobility Element (AME)—Command and control center deployed in theater where detailed planning, coordinating, and tasking for theater tanker and airlift operations are accomplished. The AME receives direction from the director, mobility forces (DIRMOBFOR). The AME is the focal point for communications and the source of control and direction for theater tanker and airlift forces.

Air Reserve Component (ARC)—Refers to Air National Guard (ANG) and Air Force Reserve Command (AFRC) forces, both Associate and Unit-Equipped.

Air Route Traffic Control Center (ARTCC)—A facility that provides Air Traffic Control (ATC) services to aircraft operating on IFR flight plans within controlled airspace, principally during the enroute phase of flight.

Air Traffic Control (ATC)—A service provided by an appropriate authority to promote the safe, orderly and expeditious use of the air transportation system and to maximize airspace utility.

Augmented Crew—Basic aircrew supplemented by additional qualified aircrew members to permit in-flight rest periods.

Bird Aircraft Strike Hazard (BASH)—An Air Force program designed to reduce the risk of bird strikes.

Bird Watch Condition (BWC) Low—Normal bird activity [as a guide, fewer than 5 large birds (waterfowl, raptors, gulls, etc.) or fewer than 15 small birds (terns, swallows, etc)] on and above the airfield with a low probability of hazard. However, a single bird in a critical location may elevate the BWC to moderate or severe.

Bird Watch Condition (BWC) Moderate—Increased bird population (approximately 5 to 15 large birds or 15 to 30 small birds) in locations that represent an increased potential for strike. However, could be caused by only a single bird in a critical location.

Bird Watch Condition (BWC) Severe—High bird population (as a guide, more than 15 large birds or 30 small birds) in locations that represent an increased potential for strike. However, could be caused by only a single bird in a critical location.

BLUE BARK—US military personnel, US citizen civilian employees of the Department of Defense (DoD), and the dependents of both categories who travel in connection with the death of an immediate family member. It also applies to escorts for dependents of military members traveling under competent orders.

Border Clearance—Those clearances and inspections required to comply with federal, state, and local agricultural, customs, immigration, and immunizations requirements.

COIN ASSIST—Nickname used to designate dependent spouses accompanying dependent children and dependent parents of military personnel reported missing or captured who may travel space available on military aircraft for humanitarian purposes on approval of the Chief of Staff, United States Army; Chief of Staff, United States Air Force; Chief of Naval Operations; or the Commandant of the Marine Corps.

Command and Control (C2)—Exercise of direction and authority over assigned forces by a properly designated command echelon in the accomplishment of the mission.

Command and Control (C2) Center—Each C2 center provides supervision, guidance, and control within its assigned area of responsibility. For the purpose of this manual, C2 centers include operations centers, local AMC C2s, air mobility elements, contingency response elements/groups (CRE/CRGs), air mobility control centers, unit command posts, and tanker task forces.

Contingency Response Elements/Groups (CRE/CRGs)—Team of qualified Air Force personnel established to control, coordinate, and function as an Air Force tanker and airlift C2 facility at a base where normal AMC C2 facilities are not established or require augmentation. CRE/CRGs support and control contingency operations on both a planned and no-notice basis.

Contingency Fuel—An additional 15 minutes of fuel to compensate for unforeseen circumstances during any phase of flight (i.e. unforecasted weather, launch delay, etc). Contingency fuel will not be considered reserve fuel since crews may burn some or all of their contingency fuel at any time during the mission. Identified extra to compensate for unforeseen circumstances during any phase of flight (i.e. unforecasted weather, launch delay, etc).

Contingency Mission—Mission operated in direct support of an OPORD, OPLAN, disaster, or emergency.

Crew Resource Management (CRM)—The effective use of all available resources—people, weapon systems, facilities, and equipment, and environment—by crews to safely and efficiently accomplish an assigned mission or task.

Critical Phase Of Flight—Takeoff, air refueling, airdrop, approach, or landing.

Depressurization Fuel—Depressurization fuel will be calculated in MAFPS at FL250/10,000‘ altitude. If additional fuel is required from the Depressurized Engine Out ETP, then MAFPS automatically adds the additional fuel into the Ramp Fuel.

Deviation—A deviation occurs when takeoff time is not within -20/+14 minutes of scheduled takeoff time.

Director, Mobility Forces (DIRMOBFOR)—Individual responsible for theater mobility force management. The Air Force component commander exercises operational control of assigned or attached mobility forces through the DIRMOBFOR. The DIRMOBFOR monitors and manages assigned mobility forces operating in theater. The DIRMOBFOR provides direction to the Air Mobility Division in the AOR to execute the air mobility mission and will normally be a senior officer familiar with the AOR.

Distinguished Visitor (DV)—Passengers, including those of friendly nations, of star or flag rank or equivalent status, to include diplomats, cabinet members, members of Congress, and other individuals designated by the DoD due to their mission or position (includes BLUE BARK and COIN ASSIST).

Double Blocking—When an aircraft is required to block-in at one parking spot, then move to normal parking for final block-in. The extra time required for double blocking will be taken into account during mission planning/scheduling. To compensate for double blocking on departure, the aircrew "legal for alert time" may be adjusted to provide additional time from aircrew "show time" to departure. When double blocking is required on arrival, the aircrew’s entry into crew rest will be delayed until post-flight duties are complete.

Due Regard—Operational situations that do not lend themselves to International Civil Aviation Organization (ICAO) flight procedures, such as military contingencies, classified missions, politically sensitive missions, or training activities. Flight under "Due Regard" obligates the PIC to be his or her own air traffic control (ATC) agency and to separate his or her aircraft from all other air traffic. See FLIP General Planning, sec. 7.

Equal Time Point (ETP)—Point along a route at which an aircraft may either proceed to First Suitable Airfield (FSAF) or return to Last Suitable Airfield (LSAF) in the same amount of time based on all engines operating. FSAF/LSAF are airports closest to the coast out and coast in route of flight that meet applicable destination alternate requirements.

Estimated Time In Commission (ETIC)—Estimated time required to complete required maintenance.

Execution—Command-level approval for initiation of a mission or portion thereof after due consideration of all pertinent factors. Execution authority is restricted to designated command authority.

Familiar Field—An airport in the local flying area at which unit assigned aircraft routinely performs transition training. Each operations group commander will designate familiar fields within their local flying area.

Fuel Reserve—Amount of usable fuel that must be carried beyond that required to complete the flight as planned.

Global Decision Support System (GDSS)—AMC's primary execution command and control system. GDSS is used to manage the execution of AMC airlift and tanker missions.

Ground Time—Interval between engine shut down (or arrival in the blocks if engine shutdown is not scheduled) and next takeoff time.

Hazardous Cargo or Materials (HAZMAT)—Articles or substances that are capable of posing significant risk to health, safety, or property when transported by air and classified as explosive (class 1), compressed gas (class 2), flammable liquid (class 3), flammable solid (class 4), oxidizer and organic peroxide (class 5), poison and infectious substances (class 6), radioactive material (class 7), corrosive material (class 8), or miscellaneous dangerous goods (class 9). Classes may be subdivided into divisions to further identify hazard, i.e., 1.1, 2.3, 6.1, etc.

Joint Airborne/Air Transportability Training (JA/ATT)—Continuation and proficiency combat airlift training conducted in support of DoD agencies. Includes aircraft load training and service school support. AMC headquarters publishes JA/ATT tasking in AMC OPORD 17-76, annex C, appendix 1.

Loading Time—Specific time established jointly by the commanders concerned when aircraft loading will begin.

Local Training Mission—A mission scheduled to originate and terminate at home station (or an off-station training mission), generated for training or evaluation, and executed at the local level.

Mobility Air Forces Automated Flight Planning System (MAFPS)—software supports AOC-level mission planning for Mobility Air Forces global strategic airlift, aerial refueling, and tactical airlift missions. Replaces Legacy AMC Advanced Computer Flight Plan (AFCP) mission planning system. MAFPS is further designed to provide a means for mission planners to optimize route planning with respect to flight mission time and fuel considerations.

Mission—Movement of aircraft from a designated point of origin to a designated destination as defined by assigned mission identifier, mission nickname, or both in the schedule, mission directive, OPORD, OPLAN, or FRAG order.

Mobility Air Force (MAF)—Forces assigned to mobility aircraft or MAJCOMs with operational or tactical control of mobility aircraft.

Operational Control (OPCON)—Functions of command and control involving composition of subordinate forces, authority to approve allocation of assets to specific missions, assignment of tasks, designation of objectives, and authoritative direction necessary to accomplish the mission. This is a higher authority than the command that performs specific mission functions.

Operational Necessity—A mission associated with war or peacetime operations in which the consequences of an action justify the risk of loss of aircraft and crews.

Operational Risk Management (ORM)—ORM is a logic-based, common sense approach to making calculated decisions on human, materiel, and environmental factors before, during, and

after Air Force operations. It enables commanders, functional managers and supervisors to maximize operational capabilities while minimizing risks by applying a simple, systematic process appropriate for all personnel and Air Force functions.

Operational Missions—Missions executed at or above 618 AOC (TACC) level. Operational missions termed "CLOSE WATCH" include CORONET missions and AFI 11-221, *Air Refueling Management (KC-10, KC-46, and KC-135),* priority 1, 2, and 3 missions tasked by the 618 AOC (TACC). Other operational missions such as deployment, re-deployment, reconnaissance operations, operational readiness inspections (ORI), AMC channel or SAAM, and JA/ATT missions may be designated "CLOSE WATCH" as necessary.

Operations Plan (OPLAN)—A plan for a single or a series of connected operations to be carried out simultaneously or in succession, based on stated assumptions; a directive to permit subordinate commanders to prepare supporting plans and orders.

Over water Flight—Any flight that exceeds power off gliding distance from land.

Permit to Proceed—Aircraft not cleared at the first US port of entry may move to another US airport on a permit to proceed issued by customs officials at the first port of entry. This permit lists the requirements to be met at the next point of landing, i.e. number of crew and passengers, cargo not yet cleared. PIC are responsible to deliver the permit to proceed to the customs inspector at the base where final clearance is performed. **Note**: Heavy monetary fines can be imposed on the PIC for not complying with permit to proceed procedures.

Positioning and De—positioning Missions - Positioning missions are performed to relocate aircraft for the purpose of conducting a mission. De-positioning missions are made to return aircraft from bases at which missions have terminated.

Required Ramp Fuel Load (RRFL)—Minimum fuel required at engine start to complete tasked mission. Required ramp fuel load will consist of all fuel required for engine start, taxi, APU operation, takeoff, enroute, enroute reserve, contingency, air refueling, decompression (depressurization), descent, approach and landing, alternate, transition, holding/minimum landing.

Scheduled Takeoff Time—Takeoff time is established in the schedule or OPORD. For air aborts and diversions, this will be engine shut down time (or arrival in the blocks if engine shutdown is not scheduled) plus authorized ground time. Early deviation does not apply to aborts or diversions unless the mission is formally rescheduled by current operations. Scheduled takeoff time may be adjusted to make good an ARCT. Notify controlling agency prior to takeoff to adjust the scheduled takeoff time.

Section—Subdivision of a formation. A section normally consists of 6 aircraft (2 elements).

Special Assignment Airlift Mission (SAAM)—Funded airlift that cannot be supported by channel missions because of the unusual nature, sensitivity, or urgency of the cargo or that requires operations to points other than the established channel structure.

618 Tanker Airlift Control Center (618 AOC)—Operations center that controls tanker and airlift forces worldwide through a network of computer systems. The 618 AOC, Tanker Airlift Control Center (TACC) is organized into geographic cells consisting of East, West, and Emergency Action Cells. The 618 AOC (TACC) contains the following functions: Mobility Management, Global Channel Operations, Operations Management, Current Operations, Global Readiness, Weather, Logistics Readiness Center, Aerial Port Control Center, International Clearances, and Flight Plans.

Tactical Event—A flight event that, due to its complexity and/or increased risk due to fatigue, limits the period within a crew‘s duty day the event may be performed. Not all tactical maneuvers are considered a tactical event. C-17 tactical events are Airdrop, Low Level, Non- SKE Formation, SKE Formation Greater Than 2-Ship, Assault Landing/Takeoff, Tactical Approaches/Departures, and Landings to an AMP 3 configured airfields at night. Events not listed, such as penetration descents and standard traffic pattern altitude downwind and overhead approaches, are not tactical events.

Tanker Task Force (TTF)—Force of tanker aircraft assembled and tasked to perform a specific function.

Tankered Fuel—Additional fuel carried through a primary destination for use on a subsequent leg.

Training Mission—Mission executed at the unit level for the sole purpose of aircrew training for upgrade or proficiency. Does not include operational missions as defined in this manual.

Unilateral—Operations confined to a single service.

Unit Type Code (UTC)—A 5-letter or -digit combination code used to identify standard deployment packages of personnel and equipment in a data automation environment.